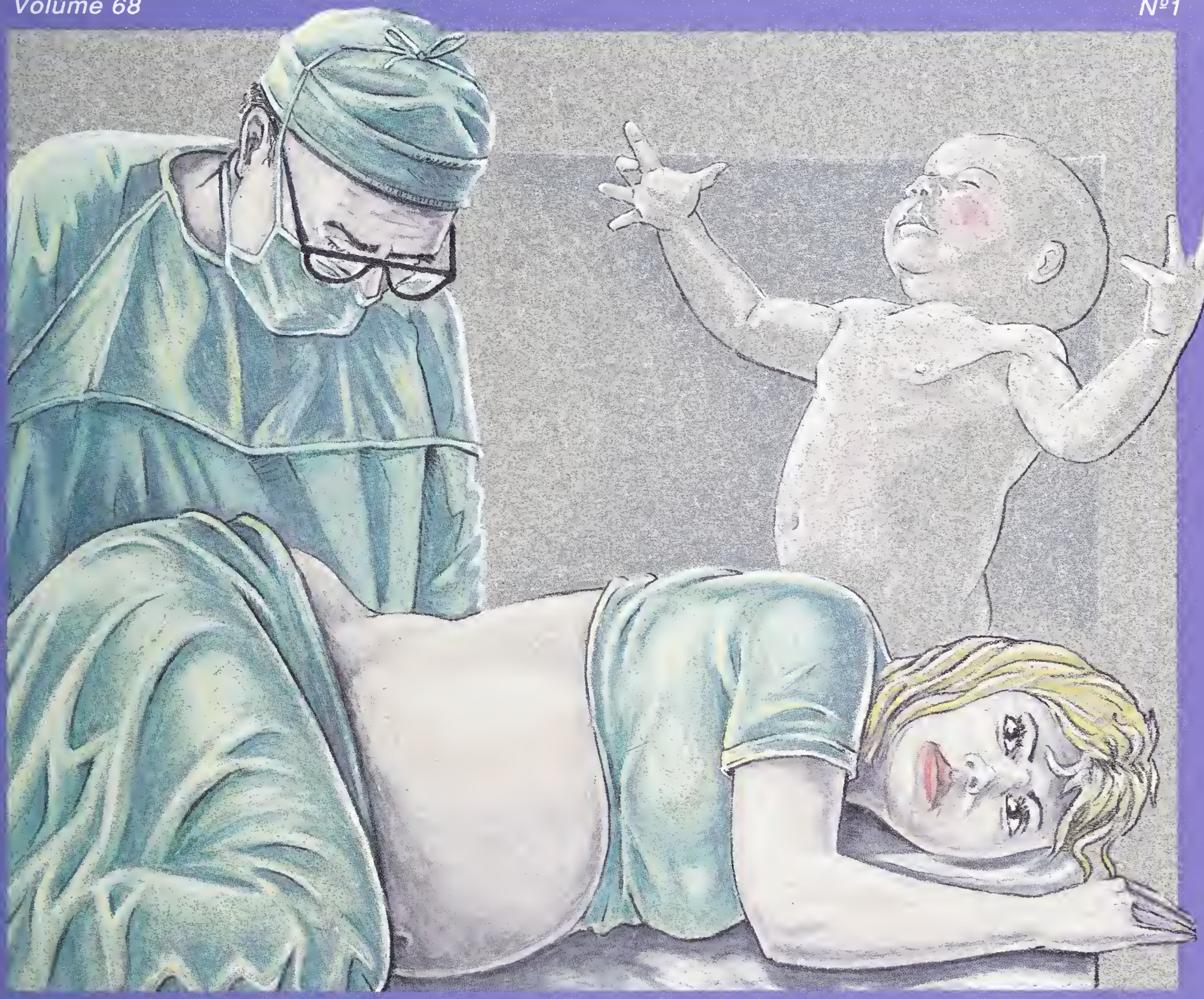
University of Toronto

MEDICAL JOURNAL

Volume 68 Nº1



• Marijuana and Glaucoma • Acupuncture and Traditional Chinese Medicine • Epidural anaesthesia in labour using three different local anaesthetics • Organ Transplants - Issues in Jewish Biomedical Ethics • Palliative Care • Common Foot and Ankle Injuries • Quick Diagnosis • Impressions • News and Views • Book Reviews

Quality. No Compromise.

In today's highly competitive pharmaceutical industry, Novopharm is committed to the production of high quality pharmaceuticals.

Highly skilled and dedicated professionals utilize the latest scientific technology to develop and manufacture the high quality products which are representative of Novopharm's standard of excellence.

We never compromise when it comes to our guiding principle... ***quality above all.***

That's one reason why more prescriptions are filled with the Novopharm brand than any other brand in Canada.

novopharm ltd.

1290 Ellesmere Road, Scarborough, Ontario M1P 2Y1
(416) 291-8876

Number One in Canada in Prescriptions Dispensed.*

*Data on file.

PAAB CCPP

University of Toronto

MEDICAL JOURNAL

Established in 1923, An Undergraduate Publication *Volume 68 - Nº1, December 1990*

P. 11

P. 15

P.24

Contents

7 OPHTHALMOLOGY

Marijuana and Glaucoma- A Review
Ian Finkelstein, B.Sc., 9T4, Andrew Taylor, B.Sc., 9T1, Graham E. Trope, M.D., Ph.D., F.R.C.S. (C), F.R.C.S. (Edin.), Dip. Ophth. (Eng.)

11 ALTERNATIVE MEDICINE

Acupuncture and Traditional Chinese Medicine
Jitka Lom, 9T2

15 FEATURE ARTICLE

A Comparison oe the Efficacy of Epidural Anesthesia in Labour Using Three Different Local Anesthetic Solutions
Stephen H. Rolbin, M.D.C.M., F.R.C.P.(C), Robin Unger, Phillip Hew-Wing, M.D., F.R.C.P.(C), Deena Kapala, and Shyam Radhakrisnan

20 BIOMEDICAL ETHICS

Organ Transplantation: Issues in Jewish Biomedical Ethics
Alden J. Pearl, B.Sc., 9T1

24 PALLIATIVE CARE

Palliative Care - A Patient Centered Approach
Jeffrey Handler, M.Sc., 9T2, Claire Robertson, 9T2 and Edward Gutman, M.D. 8T2, C.C.F.P.

28 ORTHOPEDICS

Common Foot and Ankle Injuries in athletes
Chris Giorshev, 9T1 and Perry J. Rush, M.D.C.M., F.R.C.P.(C).

32 QUICK DIAGNOSIS

Respirology - X-Rays
Alan Barolet 9T2

34 IMPRESSIONS

A Clerkship Elective in Northwestern Ontario
Jonathan Marcus, 9T1
Bolivia: More than Just the Land of Cocaine
Mark S. Moores, B.Sc., 9T2

37 NEWS AND VIEWS

A Transgenic Approach to the Genetics of Development and Disease
Gene Therapy: Is it almost here?
Paul Ellis, M.Sc., 9T2

38 BOOK REVIEWS

Editorial

Mark Bradley Noss
Shanthi Vasudevan

This year, the University of Toronto Medical Journal is entering its 68th year of publication. We consider it a privilege to be the editors of this premier undergraduate Medical Journal in Canada. It is our aim to build upon this tradition of excellence.

The format of this year's Journal will be similar to that of last year with few additions. In keeping with a new policy initiated by last year's editors, the abstracts will be published both in English and French. The News Update section of the previous years will be published as News and Views. We plan to publish the Gairdiner Award lectures in the forthcoming issues since it is our hope that this will give the Journal a broader appeal. To enable us to continually improve the quality of the Journal, we would appreciate feedback from our readers. We are therefore planning to include a '***Letters to the Editors***' section. Please send us your comments, thoughts and/or impressions of the Journal and its contents.

The editorial staff for this year's publication were carefully selected from a wide number of well qualified candidates. We think that our board reflects a broad base of knowledge. We are also fortunate to have Rick Kogucki, a very talented individual, as our artistic director. Working with Rick are a group of well qualified artists from the faculty of Arts as Applied to Medicine. Their drawings appear as our cover illustration and also accompany each article providing a special flavour to the Journal.

It is a challenge for us to produce an issue that will be of interest to a wide variety of medical students, staff and researchers. To this end, we have chosen articles on a broad range of topics. This issue includes articles on use of Marijuana in the treatment of glaucoma, traditional Chinese Medicine as experienced by the author in China, and palliative care. The feature article of this issue describes a comparison of efficacy of three different epidural anaesthetic solutions. This is an article which will be of value to both medical students and medical practitioners alike. It is our pleasure to publish the winning essay of the first annual biomedical ethics essay competition. This article addresses the issues of organ transplantation from a Jewish perspective. Also included in this issue are Quick Diagnosis, Impressions, News and Views and Book Reviews.

The Journal has been serving as a medium in which students can communicate their research and clinical experiences. In the future, it is our goal to encourage students to write articles in both the basic and clinical sciences. Again this year, the Journal will award several prizes to the articles published (Please see inside announcement for details).

Editorial Staff

Editors-in-Chief
Mark Bradley Noss, M.Sc., 9T2
Shanthi Vasudevan, Ph.D., 9T2

Associate Editors
Mohammed N. Mahomed, 9T2
Corinne Fischer, 9T3

Book Reviews Editor
Bjug Borgundvaag, Ph.D., 9T2

Quick Diagnosis Editor
Alan Barolet, 9T2

News and Views
Paul Ellis, M.Sc., 9T2

Editorial Board
Paul E. Bernick, B.Sc., 9T2
Nicoletta Bonafede B.Sc., 9T2
Ronny Kafiluddi, B.Sc., D.R.S., Ph.D., 9T3
Ubendranauth Kalicharren, B.Sc., 9T3
Joel A. Kirsh, B.A.Sc., M.Sc., 9T2
Mitesh Mehta, 9T1
Amita Patnaik 9T2
Owen Prouse, 9T4
Nicola Richmond, 9T2
Line Vautour, 9T2

Secretary
Mrs. Audrey Randall

Treasurer
Cheryl Jaigobin, 9T2

Advertising Director
Bjug Borgundvaag, Ph.D., 9T2

Artistic Director
Rick Kogucki, B.Sc., B.Sc. A.A.M., 9T1

Arts as Applied to Medicine
Dianne Drummond, B.A., B.Sc. A.A.M., 9T2
Marc Gosselin, B.Sc. A.A.M., 9T2
Chantal Lichaa, B.A., B.Sc. A.A.M., 9T2
Luba Magdenko, B.A., B.Sc. A.A.M., 9T2
Gino Maulucci, B.Sc., B.Sc. A.A.M., 9T2
Heather Milne, B.Sc. A.A.M., 9T2
Cynthia Stolovitz, M.D., B.Sc. A.A.M., 9T2
Nicholas Woolridge, B.F.A., B.Sc.A.A.M., 9T2

Faculty Consulting Advisor
Dr. Catherine G. Chalin

Patrons

The Journal Staff and the Medical Society wish to thank the following patrons for their generous support:

Dr. Susan Abbey
Dr. Sharon M. Abel
Dr. Arnold Aberman
Dr. Paul Adam
Dr. Peter W. Alberti
Dr. Gerald J. Alexander
Dr. E.C. Allen
Dr. Douglas Alton
Dr. Aubie Angel
Dr. Crawford Anglin
Dr. Sylvia Asa
Dr. Mary Jane Ashley
Mr. W. A. Backley
Dr Michael A. Baker
Dr. B. Balshin
Dr. Eric J. Barker
Dr. Jack Barkin
Dr. Marshall Barkin
Dr. Colin Baylis
Dr. Susan Belo
Dr. Sam Berger
Dr. John A. Beswick
Dr. H. Birman
Dr. Sonia D. Bot
Dr. L. Boxall
Dr. J. L. Brayley
Dr. Irvin Broder
Dr. Charles B. Brown
Dr. P.J. Brueckner
Dr. Martin Buckspan
Dr. Patricia Burrows
Dr. Brian Butler
Dr. David S. Byers
Dr. Doreen Campbell
Dr. Lorie Cappe
Dr. A. Cecutti
Dr. Catherine G. Chalin
Dr. Israel Chambi
Dr. Morris Charendoff
Dr. Davy Cheng
Dr. Albert Cheske
Dr. Yuet Cheung
Mrs. Mary Chipman
Dr. A. F. Colantonio
Connaught Laboratories Limited
Dr. John Connolly
Dr. J.J. Connon
Dr. S.J. Coombs
Dr. Donald Cowan
Dr. William Crysdale
Dr. Donald Currie
Dr. Iyabo O. Daramola
Dr. Derek A. Davidson
Dr. Mervyn Deitel
Dr. G.O. De villa
Dr. H. Roslyn Devlin
Dr. S. P. Dhiman
Dr. Bernard Dickens
Dr. John Dirks
Dr. Robert Disenhouse
Dr. Sarma Dittakavi
Dr. James Dubbin
Dr. James Duffin
Dr. Stuart Z. Dyment
Dr. Gerald Edelist
Dr. John F. Edmonds
Dr. Michael England
Family and Community Medicine, SHC
Dr. Stan Femberg
Dr. Ronald Fenton
Dr. Stanley Fenton
Dr. J. Fleming
Dr. I. Fettes
Dr. Frank J. Foley
Dr. Michael Ford
Dr. W.C.F. Forder
Dr. Rodney Fowler
Dr. W.H. Francombe
Dr. Arnis Freiberg
Dr. Norman E. Fremes
Dr. Gorden Froggatt
Dr. A. E. M. Geisler
Drs. Richard & Joan Gladstone
Dr. Wilton R. Glenney
Dr. David Goldberg
Dr. Melvyn Goldberg
Dr. Michael R. Goldberg
Dr. Barry Goldlist
Dr. Irvin Gollish
Dr. M.K. Gospodarowicz
Dr. Robin Gray
Dr. Paul Greig
Dr. David Greyson
Dr. Allan E. Gross
Dr. Michael L. Guinness
Dr. Abraham L. Halpern
Dr. Arthur Ham
Dr. Mary Hannah
Dr. Walter J. Hannah
The Hannah Institute
Dr. Gordon D. Hardacre
Dr. Ian Harrington
Dr. John Hart
Dr. Bart Harvey
Dr. Robert Haslam
Dr. Elizabeth Heathcote
Dr. Roberte Hegele
Dr. Murray Herst
Dr. R. C. Hicks
Dr. Robert Hilliard
Dr. Sophie Hofstader
Dr. Richard Holloway
Dr. Richard Holtby
Dr. W. J. Horsey
Dr. Robert Howard
Dr. Michael Howcroft
Dr. Shao-Nan Huang
Dr. Alan Hudson
Dr. Robin Humphreys
Dr. Gordon Hunter
Dr. M. Hutcheon
Dr. R.H. Hyland
Dr. I. de la Iglesia
Dr. Robert W. Jackson
Dr. D. G. Jagdeo
Dr. Christopher Jamieson
Dr. D. Anna Jarvis
Dr. Michael Jewett
Dr. Maridene Johnston
Dr. Donald Jones
Dr. Albin T. Jousse
Dr. Alexander Kennedy
Dr. Donald W. Kilfinger
Dr. Max Kleinman
Dr. Amira Klip
Dr. Irvine A. Korman
Dr. Colm Kovacs
Dr. Stephen Kraft
Dr. V. Kurdyak
Dr. Richard Lamon
Dr. Edward Lansdown
Dr. Catherine Y. Lau
Mr. Joseph Lavoie
Dr. D. Lawee
Dr. Peter Lee
Dr. Lawrence Letter
Dr. Nicholas Leyland
Dr. Samuel Librach
Dr. H. Lavina Lickley
Mr. Sidney Liswood
Dr. Walter M. Little
Dr. Lynn Loach
Dr. Konstantin R. Loewig
Dr. Mark Lowrey
Dr. Frederick Lowy
Dr. John Lundon
Dr. Allan Luxton
Dr. Ross Mackay
Dr. Susan Mackinnon
Dr. J. L. Madigan
Dr. Aaron Malkin
Dr. Dina Gordon Malkin
Dr. Constantine Mallin
Dr. O. L. Mandel
Dr. Janus Marley
Dr. Joseph Marotta
Dr. Ana Marquez-Julio
Dr. A. Bruce Marshall
Dr. Ray Martin
Dr. B. Massouda
Dr. R.C. Maycee
Dr. Steven McCabe
Dr. Nancy McKee
Dr. James B.J. Mckendry
Dr. David Meneely
Dr. D. T. Meneely
Dr. Rosemary Meier
Dr. Charles Merrill
Dr. Peter Mingie
Dr. Kenneth Money
Dr. K. Moore
Dr. Brian Morris
Dr. Heather Morris
Dr. Rebeka Moscarello
MSH OTL Associates
Dr. Paul J. Muller
Dr. Salim Naqvi
Dr. Hugh R. C. Norman
Obstetrics & Gynaecology Dept
St. Michael's Hospital
Dr. Richard Ogilvie
Dr. Dimitrios Oreopoulos
Otolaryngology Assoc., TGH
Dr. David Ouchterlony
Dr. Titus Owolabi
Dr. Harry Palter
Dr. Fred Papsin
Dr. H. Pasternak
Dr. Robert Patten
Dr. Alexander Patterson
Dr. Thomas V. Patterson
Dr. Gordon A. Pengelly
Dr. A. C. Percheson
Dr. Richard G. Perrin
Dr. Mel Petersiel
Dr. Anne M. Phillips
Dr. D.G. Pond
Dr. Peter Y. Poon
Dr. Annette Poon-Toye
Dr. Jeffrey Posnick
Dr. Kathleen Pritchard
Dr. Kenneth Pritzker
Dr. John Provan
Dr. Ian Quirt
Dr. Anita Rachlis
Dr. Kenneth Reed
Dr. Robert N. Richards
Dr. Robin Richards
Dr. Kenneth Robb
Dr. Fred Rosen
Dr. Irving Rosen
Dr. Irving F. Rosen
Dr. John Ross
Dr. Lorne E. Rotstein
Dr. Cheryl Rowe
Dr. Peter Rumney
Dr. Fred Sabil
Dr. Irving Salit
Dr. Robert B. Salter
Dr. Mahender Sarin
Dr. Thomas Shaw Stiftel
Dr. Michael Shier
Dr. Jerry Shume
Dr. Barry H. Shrott
Dr. Jack Shuber
Dr. K. H. Shumak
Dr. Brian N. Silver
Dr. Malcolm Silver
Dr. Bernard Silverman
Dr. Louis Simmovitch
Dr. Carlton G. Smith
Dr. J. Donald Smith
Dr. Kenneth W. Sniderman
Dr. Glasier Somerville
Dr. P. A. Spear
Dr. Russell Springate
Dr. John C. Stears
Dr. Donald A. Stewart
Dr. Margaret Stoicheff
Dr. Robert Stone
Dr. & Mrs. I. Strashun
Dr. Albert C. Strickler
Dr. Charles Tator
Dr. John Taylor
Dr. Ron Taylor
Dr. Marvin Tile
Dr. George X. Trimble
Dr. Graham Trope
Dr. William S. Tucker
Prof. Gerald Turner
Dr. Lorne Umemoto
Dr. Martin G. Unger
Dr. Gerald Urbach
Dr. Joan M. Vale
Dr. Marica Varga
Dr. Hillar Vellend
Dr. Christopher Wallace
Dr. Peter Webster
Dr. Victor Weinberg
Dr. Solomon Weinstock
Dr. Richard D. Weisel
Dr. Sheila Weitzman
Dr. F. Douglas Wigle
Dr. Robert Wilkinson
Dr. D.R. Wilson
Dr. Jonathan Wilson
Ms. Dorothy Wylie
Dr. Dennis Xuereb
Dr. James Yao
Dr. Douglas E. Yates
Dr. Shery Zener
Dr. Maria Zorzitto
Dr. Ronald Zuker

University of Toronto

MEDICAL JOURNAL

Room 2141, Medical Sciences Building, Toronto, Canada, M5S 1A8 (416) 978-8730

Dear Reader:

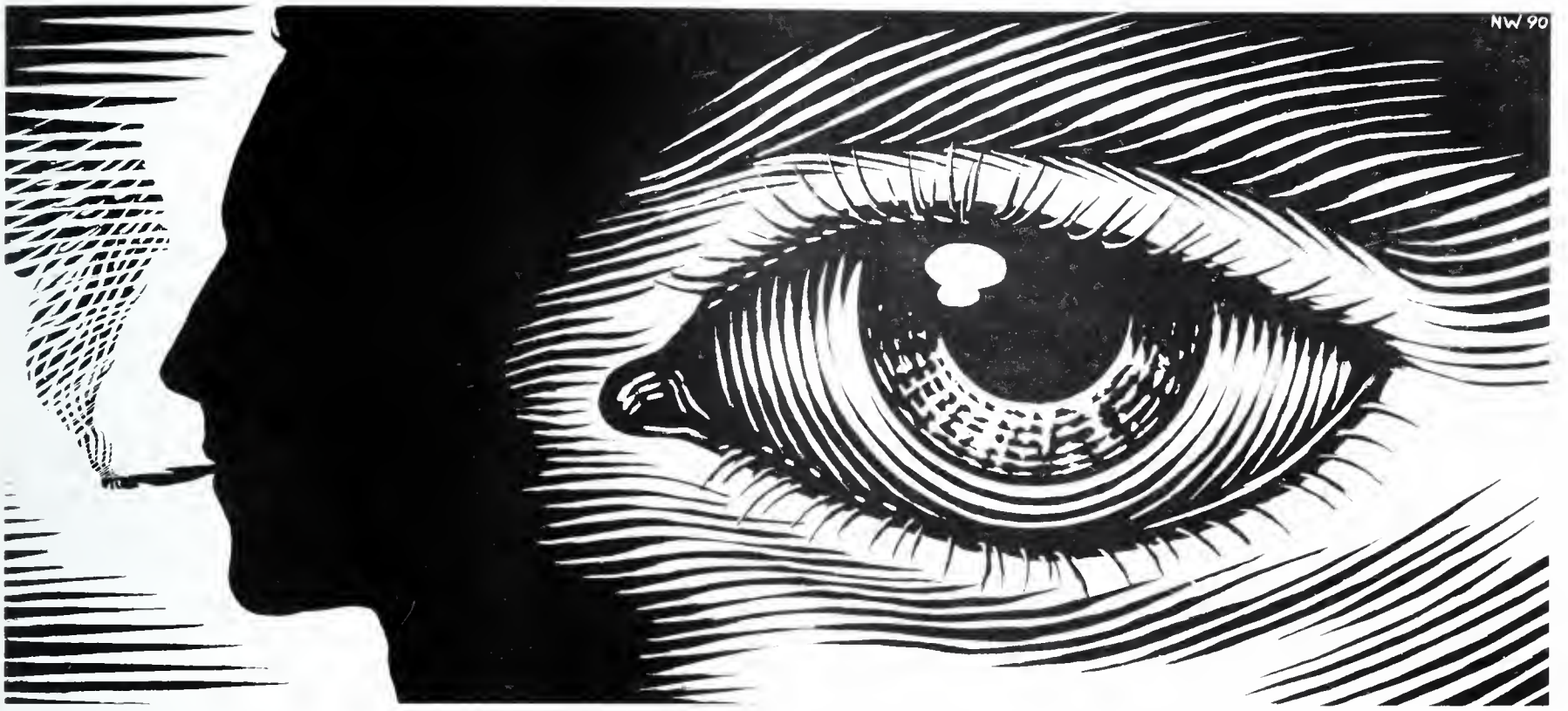
We are writing this letter to request your assistance with a difficult situation. As of the summer of 1990, the University of Toronto Medical Journal is experiencing financial difficulties. This has come about as a result of the fact that the Federal Government has retroactively withdrawn our Federal Sales Tax Exemption. This then translates to a debt of approximately $8000.00 over a two year period (1988-1989, 1989-1990).

In order for the Medical Journal to survive, your monetary assistance is urgently requested. Any financial assistance on your part would be greatly appreciated. Thanking you in advance, we remain

Respectfully yours.

Shanthi Vasudevan · Mark

Shanthi Vasudevan and Mark Bradley Noss
Editors-in-Chief



MARIJUANA AND GLAUCOMA - A REVIEW

Ian Finkelstein, B.Sc., 9T4, Andrew Taylor, B.Sc., 9T1,

Graham E. Trope, M.D., Ph.D., FRCS(C), FRCS(Edin.), Dip. Ophth.(Eng.).*

**Department of Ophthalmology, The Toronto Hospital, Toronto, Ontario.*

ABSTRACT

Since the early 1970's, marijuana has been known to decrease intraocular pressure. Interest in this drug originated in attempts to apply it to the treatment of primary open-angle glaucoma. Initial studies were concerned with the elucidation of the active compound, delta-9-tetrahydrocannabinol and the determination of a therapeutic dosing schedule. Systemic side effects, however, were found to far outweigh the therapeutic benefits attained. Research was then focused on modifications of both the drug molecule and the mode of drug delivery. Our laboratory investigated a water soluble extract of marijuana that was reported to have separated many of the undesirable systemic side effects of marijuana from the beneficial intraocular pressure lowering effects. Our experiments indicated no beneficial effects on intraocular pressure. Separation of systemic side effects while retaining intraocular pressure lowering effects remains the primary obstacle to the use of marijuana in ocular disease. At present, there is no indication for the use of marijuana in the treatment of glaucoma.

ABSTRAIT

Depuis le début des années '70s, la marijuana est reconnue comme étant capable de réduire la pression intraoculaire. L'intérêt envers cette drogue a commencé lorsqu'on a essayé de l'utiliser comme traitement du glaucome primaire à angle ouvert. En premier, les études se concernaient d'élucider le composant actif, soit d-9-tetrahydrocannabinol, et de déterminer un horaire d'administrations des doses. Enfin, les effets secondaire généraux furent trouvés trop numbreux pour rendre avantageux les bénéfices thérapeutiques atteint par la drogue. La recherche se dirigea ensuite vers la modification de non seulement la molécule en question mais aussi du moyen de délivrance de celle-ci. Notre laboratoire a poursuivi l'enquête d'un extrait de marijuana soluble dans l'eau qui apparemment sépare plusieurs des effets secondaires généraux des effets désirés, c'est-à-dire la réduction de la pression intraoculaire. Nos expériences n'ont démontré aucuns effets bénéfiques sur la pression intraoculaire. La séparation des effets secondaires généraux en conservant la propriété de pouvoir réduire la pression intraoculaire demeure l'obstacle à surmonter avant que la marijuana puisse être utilisée pour les maladies oculaires. En ce moment, il n'y a aucune indication pour l'utilisation de la marijuana dans le traitement du glaucome.

In the normal eye, the intraocular pressure (IOP) is maintained by balancing the rate of inflow of aqueous fluid with the rate of outflow of aqueous fluid. Aqueous fluid is produced by the ciliary body and secreted into the posterior chamber. It passes through the pupillary space to the anterior chamber where it is drained via the trabecular meshwork to the canal of Schlemm which then conducts it to the venous system (Fig.1).

Glaucoma refers to a group of eye diseases characterized by increased IOP. Lack of treatment leads to optic nerve degeneration causing defects in the visual field and blindness. Primary open-angle glaucoma is the most common form of glaucoma and is thought to be due to degenerative changes in the trabeculum, canal of Schlemm and adjacent channels which leads to an impedence to the outflow of aqueous fluid[1]. Consequently, this form of glaucoma is characterized by raised IOP that is usually undetected until irreversible optic nerve damage has occurred. In most instances, blindness can be prevented if treatment is instituted early. Medical therapy utilizes anticholinergics to facilitate aqueous outflow through existing drainage channels and beta-blockers and carbonic anhydrase inhibitors to decrease aqueous production by the ciliary body. Surgical intervention is indicated when medical treatment has failed to control the IOP and includes laser trabeculoplasty and/or surgical trabeculectomy.

Current medical therapy is complicated by a number of local and systemic side effects that can lead to poor patient compliance and progression of the disease. As a result, alternate drugs have been investigated to lower IOP. One of the drugs receiving a great deal of attention is marijuana. In 1971, the first published article appeared describing a fall in IOP subsequent to smoking marijuana[2]. Since this time, research has been concerned with elucidating the active principle(s) responsible for the lowering effect on IOP and the separation of the ocular effects of marijuana from the systemic side effects, including euphoria.

Numerous systemic effects are noted following the ingestion of marijuana; most notably euphoria, alterations in both male[3] and female[4] hormone levels, alterations in the immune response[5], alterations in cellular metabolism[6], emphysematous changes in the lungs[7], cardiovascular effects that include increased heart rate, orthostatic hypotension and supine hypertension in humans[8], and a decrease in IOP[9].

Marijuana contains over 400 chemicals of which approximately 60, the cannabinoids, are unique to this plant[10]. Delta-9-tetrahydrocannabinol (Δ^9 -THC) has been identified as the active constituent of marijuana that is responsible for systemic drug effects[11]. As a class, the cannabinoids are lipophilic and are thus easily dissolved in organic solvents but tend to precipitate from aqueous solutions.

Initial studies of the effects of Δ^9 -THC in decreasing IOP were performed by studying the effects of smoking the drug in both normal subjects and glaucoma patients. A consistent drop in IOP of approximately 30% was noted when Δ^9 -THC was administered by this route and this effect lasted for 4-5 hours[12]. No tolerance to the IOP lowering effects were observed and no deleterious effects on visual function or ocular structures were noted. The major ocular side effect observed was conjunctival hyperemia causing redness of the eye and decreased lacrimation. Additional studies employing different routes of administration (intravenous[9,13,14] and oral[15-17]) confirmed the IOP lowering effects of Δ^9 -THC. A dose dependent fall in IOP was observed despite variation in individual responses[18].

The reduction in IOP produced by Δ^9 -THC, as established by fluorophotometry, is primarily due to an increase in outflow facility; the ease with which fluid leaves the eye through normal outflow channels, and a minor decrease in aqueous production[18]. Animal studies have indicated that aqueous outflow facility can be increased by 200-300%[18].

The major problem elicited from human studies utilizing systemic administration of Δ^9 -THC, was the inability to separate the desirable responses of the IOP lowering effects from the undesirable systemic side effects. Clearly, the presence of CNS and cardiovascular side effects are considered unacceptable if long-term therapy with Δ^9 -THC is to be considered. It was thought that topical application of the drug would alleviate the untoward systemic effects and with this in mind, research into the development of topical drops of Δ^9 -THC was begun.

The major obstacle in the development of topical drops incorporating Δ^9 -THC was the elucidation of an appropriate delivery vehicle because of the lipophilic nature of the compound. It was found that low viscosity mineral oil provided the maximum ocular delivery of the drug[19]. Initial studies with Δ^9 -THC suspended in light mineral oil indicated that it reduced IOP in rabbits, but that sufficient systemic absorption occurred to cause a fall in IOP in the contralateral eye[20]. Others found that topical application of Δ^9-

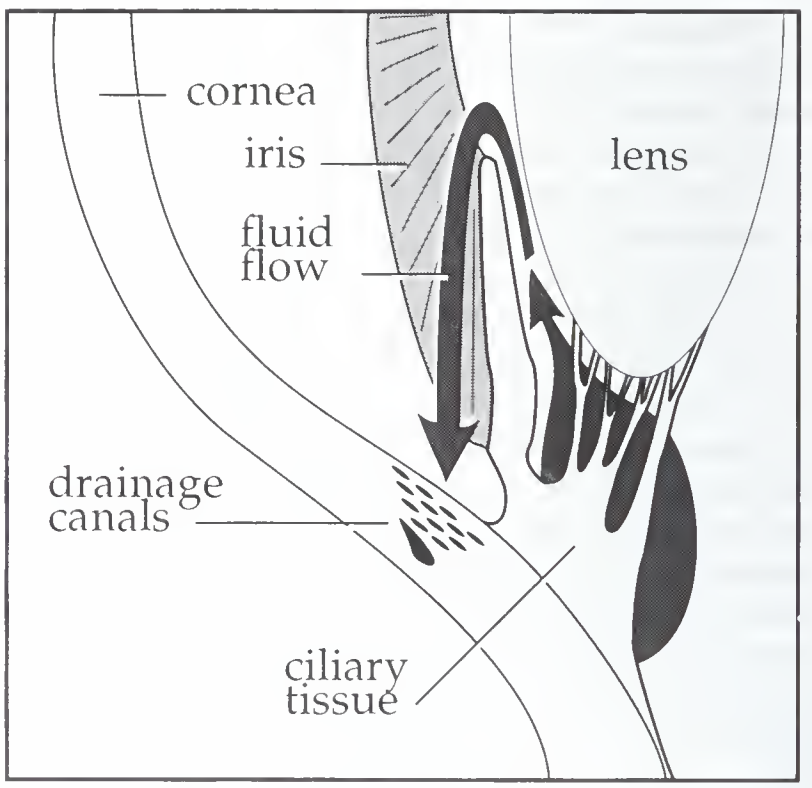


Fig. 1. Aqueous production and flow in the eye.

THC caused a reduction in IOP in dogs[21] and monkeys[22]. Human trials, however, failed to substantiate these results. Δ^9 -THC in a light mineral oil vehicle was not shown to be effective when administered topically to six subjects with primary open-angle glaucoma[23]. Similar negative effects on IOP were reported from a double-blinded study in normal volunteers with topical Δ^9 -THC in mineral oil.[24,25]

Research was then focused upon potential IOP lowering effects of other cannabinoids and in delineating the specific structural features of the molecules responsible for the IOP lowering effect in the hope of synthesizing a more ocular-selective drug. A comparison of a number of cannabinoids administered intravenously in animals indicated that various structural moieties were necessary in reducing IOP[24-26]. These structural requirements include the presence of a methyl or methyl-hydroxy group at the C-9 position and the presence of intact ring structures elsewhere on the molecule. Both Δ^9 - and Δ^8-THC were active in reducing IOP[25, 26]. Several cannabinoids, with the exception of cannabidiol, were found to reduce IOP[24]. Numerous drugs have been proposed but their development has been hindered by the development of ocular toxicity, loss of IOP lowering effect, or systemic complications. Current research is aimed at developing a 'pro-drug' in which an inactive precursor is introduced into the eye and metabolized to an active compound within the ocular tissues[27].

Others have been studying the presence of non-cannabinoid, water soluble substances found in marijuana that are also active in reducing IOP[27]. Studies on this marijuana-derived material (MDM) indicate that it is a pectic polysaccharide derived from the cell wall[27]. In contrast to the mechanism proposed for the IOP lowering effects of Δ^9 -THC, research by Green indicates that MDM acts primarily by decreasing inflow to the eye by approximately 80%, with only minor effects on outflow facility[28]. Extracts of other plant cell walls including tobacco, certain flowering weeds and some vegetables including lettuce, spinach and kale have been reported to decrease IOP at low doses of between 60-400 micrograms[27]. It is too early to comment further on this work and on the structural similarities that exist between those molecules that convey common IOP lowering capabilities.

Our laboratory recently investigated a water soluble marijuana extract eyedrop that was reported to have separated the IOP lowering capabilities from the CNS effects. Figure 2 shows the effects of the marijuana extract and phosphate-buffered saline (PBS) on buphthalmic rabbit IOP over a five hour time period. Although pressure dropped over the test period, there was no significant difference between drug and placebo treatments at any point in time. Thus, our study indicated no IOP lowering effect in rabbits with congenital glaucoma. Similar to human glaucoma, the elevated IOP in buphthalmic rabbits is thought to be the result of reduced outflow facility[29]. Consequently, the buphthalmic rabbit has been reported to be a good model for aqueous suppressing glaucoma drug studies [30-32]. A laboratory analysis of this water soluble compound showed no traces of cannabis or Δ^9 -THC in the eyedrops.

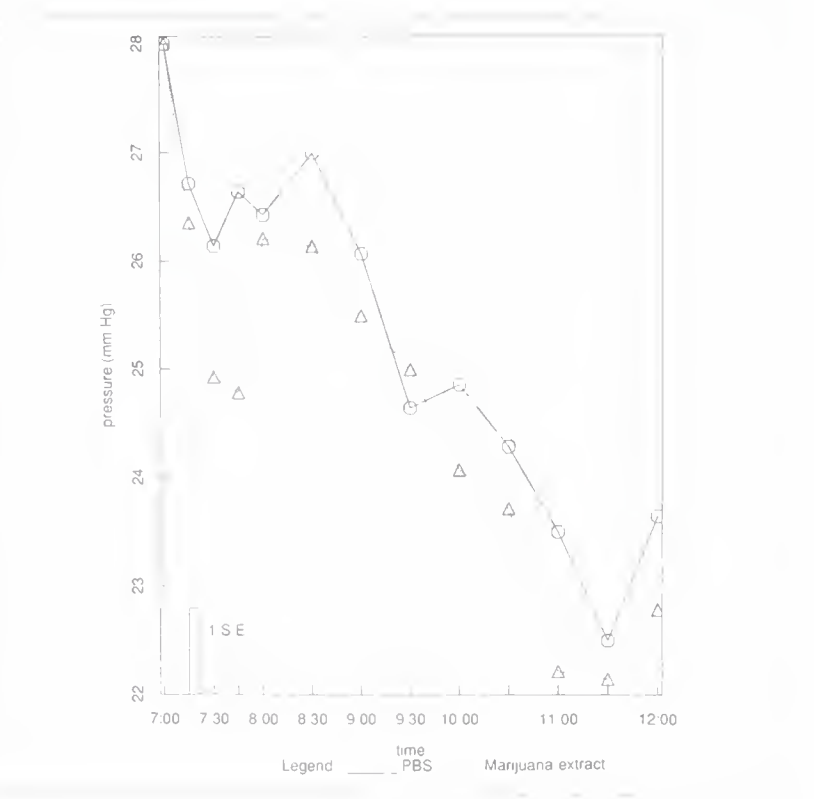


Fig. 2. The effect of water soluble marijuana extract on mean intraocular pressure (± 1 S.E.) as a function of time.

To become a useful adjunct mode of therapy in the treatment of glaucoma, any drug or surgical procedure that reduces IOP must do so without causing unacceptable damage to either the eye or other organ systems. There is considerable evidence that marijuana and some of its derivatives when smoked, taken orally or given by intravenous administration reduce IOP. However, the systemic side effects remain the stumbling block to its use. Specifically regarding the smoking of the drug, it must be emphasized that the therapeutic quantities of the drug required are large, and require inhalation of six marijuana cigarettes each day, since inhalation of one marijuana cigarette reduces IOP for approximately 4 hours[12]. Since smoking the drug induces intoxication and is illegal, there is clearly no indication at present for the use of marijuana in the treatment of glaucoma. Furthermore, no long-term studies have indicated that either marijuana or its cannabinoid derivatives lower IOP to safe levels, i.e. to levels that prevent damage to visual function in glaucoma patients. Lack of ocular specificity remains a major problem associated with the use of marijuana in the treatment of glaucoma. Numerous pharmacokinetic obstacles to the development of an effective marijuana extract that specifically lowers IOP still exist, but as a number of laboratories modify and purify new marijuana extracts, the expectations for a new drug to lower IOP look promising.

REFERENCES

1. Vaughan, D, Ashbury, T, Tabbara, KF. General Ophthalmology. Appleton and Lange, Connecticut,1989, p. 194.
2. Hepler, RS, Frank, IM. Marijuana smoking and intraocular pressure. JAMA 1971; 17: 1392.
3. Mendelson JH, Kirenhule J, Ellingboe J et al. Plasma testosterone levels before, during and after chronic marijuana smoking. N Eng J Med 1975; 291:1051-1055.

4. Graham JDP, Li DMF. The pharmacology of *Cannabis* and cannabinoids. In: Cannabis and Health, (Graham JDP, Ed.). Academic Press, New York, 1976, pp. 143-269.
5. Munson AE, Levy JA, Harris LS, et al. The effects of tetrahydrocannabinol on the immune system. In: The Pharmacology of Marijuana, (Braude MC, Szara S, Eds.). Raven, New York, 1976, pp. 187-197.
6. Nahas GG, Desouze B, Armand JP, et al. Natural Cannabinoids: Apparent depression of nucleic acids and protein synthesis in cultured human lymphocytes. In: The Pharmacology of Marijuana, (Braude MC, Szara S, Eds.). Raven, New York, 1976, pp.177-186.
7. Taschkin DP, Shapiro BJ, Rammana L, et al. Chronic effects of heavy marijuana smoking on the pulmonary function in healthy young males. In: The Pharmacology of Marijuana, (Braude MC, Szara S, Eds.). Raven, New York, 1976, pp.291-295.
8. Ungerleider JT, Andrysiak T. Therapeutic issues of marijuana and THC. The International Journal of Addictions 1985; 20(5): 691-699.
9. Razdan RK, Howes JF. Drugs related to tetrahydrocannabinol. Medicinal Research Reviews 1983; 3(2): 127-131.
10. Nahas GG. The medical use of cannabis. In: Marijuana in Science and Medicine , (Nahas GG, Ed.) Raven Press, New York, 1984.
11. Mechoulam R, Shani A, Edery H, et al. Chemical basis of hashish activity. Science 1970; 169: 611-612.
12. Nahas GG. Toxicology and pharmacology. In: Marijuana in Science and Medicine. (Nahas GG, Ed.). Raven Press, New York, 1984.
13. Adams AJ, Flom MC, Jones RT. Marijuana smoking and reduced pressure in human eyes: drug action or epiphenomenon? Investigative Ophthalmology 1975; 14:52-55.
14. Perez-Reyes M, Wagner D, Wall ME, et al. Intravenous administration of cannabinoids and intraocular pressure. In: The Pharmacology of Marijuana, (Braude MC, Szara S, Eds.). Raven Press, New York, 1976, pp. 829-832.
15. Cooler P, Gregg MJ. The effect of delta-9-tetrahydrocannabinol on intraocular pressure in humans. In: The Therapeutic Potential of Marijuana, (Cohen S, Stillman RC, Eds.). Plenum, New York, 1976, pp. 77-87.
16. Lockhart AB, West ME, Lowe HI. The potential use of *Cannabis sativa* in Ophthalmology. West Indian Medical J. 1977; 26:66-70.
17. Cooler P, Gregg MJ. The effect of delta-9-tetrahydrocannabinol on intraocular pressure in humans. In: The Therapeutic Potential of Marijuana, (Cohen S, Stillman RC, Eds.). Plenum, New York, 1976, p. 63.
18. Green K, McDonald TF. Ocular toxicity of marijuana: an update. J. Toxicol.-Cut. and Ocular Toxicol. 1987; 6(4):309-344.
19. Green K. Marijuana effects on intraocular pressure. In: Glaucoma: Applied Pharmacology and Treatment, (Drance SM, Neufeld AH, Eds.). Grune and Stratton, Florida, 1984, pp. 507-526.
20. Green K, Bigger JF, Kim K et al. Cannabinoid penetration and chronic effects in the eye. Exp. Eye Res. 1977; 24:197-206.
21. West ME, Lockhart AB. The treatment of glaucoma using a non-psychoactive preparation of Cannabis sativa. West Indian Medical Journal 1978; 27:16-25.
22. Green K. In: Symposium on Ocular Therapy, vol. 11, (Leopold IH, Burns RP Eds.). Wiley, New York, 1979. p.37.
23. Merritt JC, Perry DD, Russell DN, et al. Topical delta-9-tetrahydrocannabinol and aqueous dynamics in glaucoma. J. Clin. Pharmacol. 1981; 21:467-471.
24. El-Sohly MA, Harland E, Murphy JC, Wirth P, Waller CW. Cannabinoids in glaucoma: A primary screening procedure. J. Clin. Pharmacol. 1981;21:472-478.
25. Green K, Symonds CM, Oliver NW, Elijah RD. Intraocular pressure following systemic administration of cannabinoids. Curr. Eye Res. 1983; 2: 247-253.
26. El-Sohly MA, Harland EC, Benigni DA, Waller CW. Cannabinoids in glaucoma II: the effect of different cannabinoids on intraocular pressure of the rabbit. Curr. Eye Res. 1984; 3:841-850.
27. Green K, McDonald TF. Ocular toxicology of marijuana: An update. J. Toxicol-Cut. and Ocular Toxicol. 1987; 6(4):309-334.
28. Green K, personal communication, 1989.
29. MacMaster PRB. Decreased aqueous outflow in rabbits with congenital buphthalmia. Arch. Ophthalmol. 1960; 64:388-391.
30. Goldberg MB. Dopaminergic effects on intraocular pressure and binding in the ciliary processes. M.Sc. Thesis, University of Toronto, 1988, pp.1-96.
31. Vareilles P, Conquet P, Lotti VJ. Intraocular pressure responses to antiglaucoma agents in spontaneous buphthalmic rabbits, Ophthal. Res. 1980; 12:296-302.
32. Trope GE. Beta-adrenoceptors and intraocular pressure. Ph.D. Thesis, University of Glasgow, 1987, pp. 1-233.

The Medical Post
CANADA'S #1
SOURCE OF MEDICAL
NEWS AND INFORMATION

OCTOBER 1990

Name: _____
University/Institution: _____
Mailing Address: _____
City: _____ Prov.: _____
P/Code: _____ ☎ (_____) _____

SIGNATURE _____
(required to be valid)
DATE: _____

MAIL TO: THE MEDICAL POST
Maclean Hunter Building
Box 9100, Station A
Toronto, Ontario M5W 1A7

SAVE 50%
☐ YES
I want to take advantage of this SPECIAL 25TH ANNIVERSARY OFFER and subscribe to the Medical Post for:
☐ 3 years $36 (Reg. $72)
☐ 2 years $29.50 (Reg. $58)
☐ 1 year $20.50 (Reg. $41)
☐ Outside Canada 1 year $90

PLEASE CHECK ONE:
☐ Payment enclosed
☐ Bill me
☐ Charge to my credit card
☐ Visa ☐ Mastercard
☐ AMEX
Card # _____
Expiry Date _____

ACUPUNCTURE AND TRADITIONAL CHINESE MEDICINE

Jitka Lom, 9T2

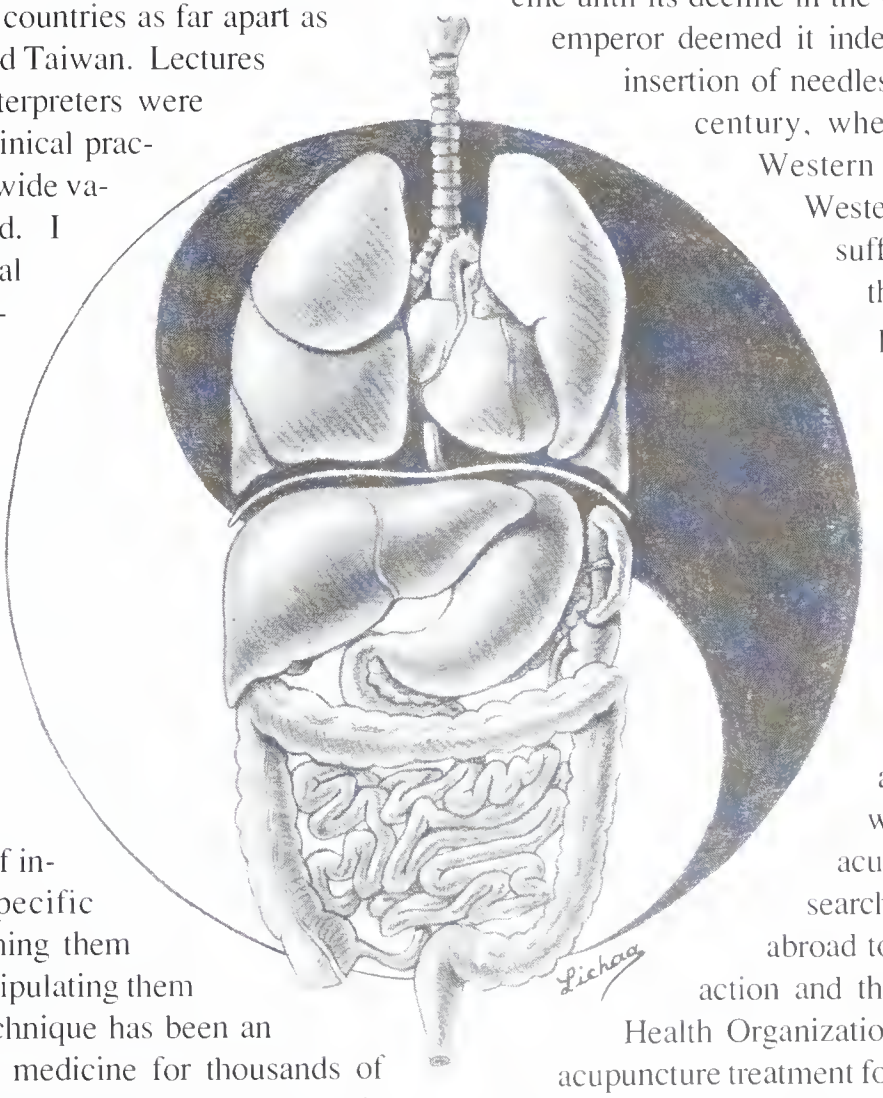
ABSTRACT

The technique of acupuncture is an important component of traditional Chinese medicine. This article deals with the history, development and application of acupuncture in China today, as well as some general aspects of traditional Chinese medical theory and diagnostic methods.

ABSTRAIT

L'acupuncture est une technique intégrale dans la médicine traditionelle chinoise. Cette revue examine l'histoire, le développement et l'utilisation actuelle de l'acupuncture en Chine. On présente aussi certains aspects généraux de la théorie et de la diagnostique de la médicine traditionelle chinoise.

Recently, I spent several months in China, studying at the Nanjing College of Traditional Chinese Medicine. This is one of four such colleges which is sponsored by the World Health Organization and offer courses in acupuncture to foreigners. Although enrolment had declined substantially because of the Tiananmen Square incident the previous summer, the eleven students in my class still represented countries as far apart as Sweden, New Zealand, Iceland, and Taiwan. Lectures were in English and excellent interpreters were provided for the many hours of clinical practise in Nanjing's hospitals, where wide variety diseases were seen and treated. I was placed at the Jiangsu Provincial People's Hospital (which, coincidentally, is twinned with Toronto's Mount Sinai Hospital), where both Western medicine and Traditional Chinese medicine are in use. In this article, I wish to present something of what I learned about the interesting and ancient technique of acupuncture in the context of traditional Chinese medical theory.



HISTORY

Acupuncture therapy consists of inserting fine needles through specific points on the body surface, retaining them for about twenty minutes, and manipulating them at intervals if necessary. The technique has been an important component of Chinese medicine for thousands of years. Archaeological excavations have unearthed bone, bamboo and pottery-shard needles from Neolithic sites. According to historical records, the earliest needles were stone "bian shi" (pricking stone). After the invention of metallurgy, gold, silver and bronze needles came into use. Nine such needles were discovered in a Hebei Province tomb dating back to 2 B.C.[1].

The "Harrison's" of traditional Chinese medicine is the *Yellow Emperor's Canon of Medicine*, a recorded summary of medical knowledge up to 220 B.C. *A Classic of Acupuncture and Moxibustion*, written in the third century A.D. gives indications and contra-indications for acupuncture, underlying theory and application for a wide variety of diseases. Both books are still in use today.

The practise of acupuncture was the mainstay of Chinese medicine until its decline in the Qing dynasty (1820's), when the emperor deemed it indecent to expose his flesh for the insertion of needles. During the early years of this century, when China was absorbing many Western colonial influences (including Western medicine) traditional therapies suffered a further decline. Following the founding of the People's Republic of China in 1949, attention returned to traditional methods of treatment and scientific research was undertaken. Today, acupuncture and Western medicine co-exist and complement each other in Chinese hospitals.

Although acupuncture is not widely practised in Canada, it is gaining recognition in the U.S.A. and is well-accepted in Europe, where many hospitals have trained acupuncturists on their staff. Research is being undertaken in China and abroad to elucidate the mechanisms of its action and therapeutic efficacy . The World Health Organization has recognized the validity of acupuncture treatment for 43 diseases, and there is increasing interest among the general public.

DEVELOPMENT

The evolution of the traditional theory of acupuncture did not occur by "scientific" means. Instead, the ancients combined a rudimentary knowledge of human anatomy and ideas about the place of man in nature with the empirical observation that massage, heat, pressure or puncture of a given spot on the body relieved or cured certain diseases. Specifically, they noticed that

pricking a particular point on the skin evoked a reaction in the viscera, and conversely, that a functional change in the viscera would often be reflected by a change (tenderness, sensitivity) at a certain point on the skin. Thus, points could be used for both diagnosis and treatment.

In addition, the discovery that needling a point always passed a particular sensation (classically numbness, soreness, or distension) along a particular route prompted the ancients to link closely-related points and establish a concept of "channels" and "collaterals". They imagined that energy or "Qi" flowed through this web of pathways between points, binding the body into an integrated whole.

TRADITIONAL THEORY

The theory of traditional Chinese medicine has evolved over centuries and is in keeping with many aspects of Chinese culture and philosophy. Initially it may seem bizarre or naive, but it must be remembered that it is based on centuries of careful observation and represents an effort to philosophically conceptualize human health and disease. Essentially, the human being is considered part of nature, an organic whole with physical, emotional, and spiritual components, who is affected by and responds to his environment.

In all natural phenomena, and consequently also in the human body, there are two opposing principles which are generally known in Chinese as Yin and Yang. The complex theory of Yin and Yang is central to traditional Chinese medicine, and may be understood as a type of positive and negative feedback system within the body, with exquisite regulatory capacity for maintaining health.

More specifically, Yin refers to the structural and substantial aspects of the body, while Yang refers to function. In nature, Yin is associated with water, stillness and female sex, and in the body it has a nourishing and moistening role. Conversely, Yang is identified with fire, motion and male sex, and has a warming and moving function in the body. Body organs are also classified according to this theory. Yin organs (such as liver and spleen) manufacture and store, while Yang organs (mainly the digestive tract) receive, digest, transmit and excrete nutrients. Disease results from an imbalance of Yin and Yang, either due to an internal deficiency of one or because of a preponderance of an external pathogenic factor which itself is either Yin or Yang . Lastly, disease syndromes may be classified as either Yin (internal, cold or deficiency type) or Yang (external, hot or excess type). Thus the theory of Yin and Yang provides a framework for the classification of disease as well as a basis for understanding the normal functioning of a healthy body.

A second theory which is important in Chinese medicine, and which is also philosophically derived, is that of the Five Elements. All natural phenomena correspond to the broad categories of wood, fire, earth, water, and metal. In Chinese medicine, this theory is used as an analogy for the relationships among body organs, and to describe the pathophysiology of disease. For example, consider the heart and kidney. Classically, the heart dominates fire and belongs to Yang, while the kidney is related to water and Yin. In health, the physiological function of both organs is normal, and there is a relative balance of "fire" and "water". There is mutual communication with the "fire" consuming "water", and "water" cooling "fire". However, if the heart is diseased, "fire" is insufficient and "water" accumulates[2]. The clinical syndrome which ensues (edema, chills, cold limbs, palpitations, shortness of breath, and heaviness in the chest) might be diagnosed in the West as heart failure.

The key to health, in terms of Chinese medicine, is physiological adaptability and internal balance. As mentioned above, disease results when an external influence exceeds the power of adaptability of the organism or when the body is unable to adjust itself to intrinsically changing conditions.

Pathogenic factors may therefore be internal or external. Exogenous pathogens include environmental influences such as wind, cold, heat, dampness and dryness. (As an aside, it is interesting to consider conventional Western folk wisdom in which one "catches cold", develops a sore throat from "sleeping in a draft", or gets a headache from "heatstroke".) Endogenous pathogenic factors are the normal human emotions when present for prolonged periods of time or in excess. For example, undue worry or grief may cause symptoms of epigastric distension and anorexia. Other miscellaneous pathogenic factors include improper diet, lack of exercise, overstrain, and trauma.

DIAGNOSIS

The diagnosis of a disease is classically made using the four methods of inquiring, inspection, auscultation/olfaction, and palpation. The history is of paramount importance (perhaps because of a lack of diagnostic tests, imaging techniques and laboratory analyses which are crucial to Western medicine). A patient is questioned about all aspects of his/her condition, including recent changes in emotional state.

Inspection involves assessment of the patient's vitality, colour and presentation, with particular emphasis on the appearance of the tongue and its coating. The variability of the tongue is indeed remarkable; at the College of Traditional Chinese Medicine we were required to study approximately 35 different models of tongues, many of which were later observed in real patients. For example, a patient with a mild febrile disease might present with a deep red tongue with a sticky yellow coating. Other types of tongues include cracked, flaccid, thin, and swollen with toothmarks, while coatings may be clear, white, moist, dry, slippery or absent.

Auscultation is traditionally limited to the quality of the patient's speech, respiration and cough, although many doctors now do auscultate the heart. Palpation is performed on the various body parts as in Western medicine. Careful assessment of a patient's pulse is necessary for a correct Chinese diagnosis. Besides considering rate and rhythm, pulses are described as superficial, deep, deficient, excess, thready, rolling, wiry, tense, soft, weak or

knotted. Each of these has a particular significance for the evaluation of an etiology and formulation of a diagnosis. For example, a patient with the febrile disease described above, might have a rapid, superficial and wiry pulse.

The hallmark of traditional Chinese medical diagnosis is differentiation of syndromes. Depending on the etiology of the disorder, the same collection of symptoms may be treated in several entirely different ways. For example, headache may putatively result from "invasion" by external wind, cold, or heat, or from internal disturbances such as excessive anger or a "deficiency of blood" (like anaemia). In the same way, a Western psychiatrist might feel that there are a variety of causes for depression, each requiring separate assessment and correction[3].

TREATMENT

Besides learning the basic contents of traditional Chinese medical theory, one of the first tasks for students of acupuncture is to learn the names, locations and indications of over 300 acupuncture points. Initially, this is a daunting task as the names are typically bisyllabic and to the non-Chinese ear they sound very similar. The locations of the points must be learned with precision, according to anatomical landmarks or proportional measurement. Effective combinations of points must also be memorized.

As mentioned above, according to Chinese medicine, acupuncture points are essentially windows to internal viscera, reflecting inner changes as well as transmitting needling sensations which are to have a beneficial effect on the organ in question. Points may be selected for both their local and distal effects.

The technique of needling is very important in acupuncture therapy. As students, we had to practise needling on a cushion for several weeks at first, then on ourselves, and finally on our fellow classmates before being allowed to puncture a patient. The needles are extremely thin (28 to 32 gauge) and it is emphasized that the patient should feel no pain. Chinese acupuncturists pride themselves on their needling techniques, and are always devising new ones. Depending on the point location, the needles are inserted to depths between 1 and 4 cm. The aim is to produce a good "needling sensation", a kind of deep ache, which is said to be necessary for good therapeutic effect. To increase the level of stimulation, the needles may be manipulated manually at intervals or hooked up to battery-driven stimulators (electroacupuncture).

Adjuvant therapies include:

Moxibustion: The dried leaves of the mugwort plant (*Artemisia vulgaris*) are commercially formed into cones or sticks. When ignited, they burn slowly with a penetrating heat which may be likened to that of a heat-lamp. Moxibustion may be applied to particular points or to larger areas like a shoulder.

Cupping: A flame heats the inside of a glass or bamboo cup which is inverted over a painful area. The partial vacuum created sucks the skin into the cup producing localized erythema and slight bruising. Interestingly enough, this technique was known to the ancient Greeks already in the 4th century B.C.[4] A modification of cupping is used by Western physiotherapists as well. Cupping is most effective for problems such as low back pain, shoulder pain and sciatica.

Massage: The technique of "tuina" combines finger pressure on particular acupuncture points with specific massage techniques. In hospitals, tuina is used primarily for musculoskeletal problems, and is often performed by blind masseurs.

In addition to the system of acupuncture points located throughout the body, new systems of points located solely on the ear pinnae, on the hands, or on the scalp have also evolved. Transcutaneous electrical nerve stimulation (TENS), which is regularly used by Western physiotherapists, also developed from studies of acupuncture.

EFFICACY

Traditional Chinese doctors use acupuncture to treat a wide variety of ailments with impressive results. Nevertheless, I found them to be very candid about the limitations of acupuncture and they did not hesitate to refer patients to the Western medicine part of the hospital when necessary. By the same token, however, people seen in the Western department were often referred for acupuncture.

During my stay in Nanjing, I saw over 250 patients in the clinic. The conditions treated most successfully were painful conditions such as headache, musculoskeletal problems (low back pain, tennis elbow, frozen shoulder, sciatica), and even biliary and renal colic. Acupuncture was also used for neurological problems such as Bell's palsy. Many different gynaecological abnormalities were treated, including dysmenorrhoea, irregular menstruation and amenorrhea. Gastro-intestinal problems such as chronic diarrhoea, epigastric pain or distension, and constipation were common as well. Other conditions included childhood asthma, incontinence and cardiac arrhythmias. Most patients required between 5 and 10 treatments for lasting therapeutic effect, although transient improvement of a condition was often seen immediately.

I also saw a rather exciting application of the technique in Beijing, where acupuncture anaesthesia was used on a patient undergoing surgery for a meningioma. The patient was conscious during the operation and was able to respond verbally to the surgeon's questions. He was not intubated.

Observers of acupuncture therapy often ask how it works. The mechanism of action of acupuncture according to Western physiological and biochemical models is being elucidated by research both in China and outside China. So far, there is evidence for the release of endogenous opiates mediating pain control and it has been demonstrated that acupuncture has significantly greater effect on pain than placebo stimulation[5,6]. Partial analgesia can also be produced in animals such as monkeys and mice, which are not susceptible to a placebo effect[7,8]. Some studies demonstrate that acupuncture changes the transmission of pain-evoked nerve impulses at several levels of the central nervous system[9].

There are difficulties in devising good clinical studies to properly evaluate the efficacy of acupuncture in treating particular disorders. Although technically feasible, double-blind studies are problematic. A truly blind procedure must be carried out by a naive and inexperienced practitioner (who would not produce an adequate standard of treatment) on patients randomly placed into treatment and control groups. "Sham acupuncture", which should be performed to test the placebo effect on the control group, is difficult to imagine. Interested readers are referred to the excellent review article on this subject by Vincent and Richardson[3]. Nevertheless, proper studies are needed to assess acupuncture treatment objectively and to dispel continuing scepticism about its use.

ACKNOWLEDGMENTS

Many thanks to Li Liang-yu of the Nanjing College of Traditional Chinese Medicine for his helpful suggestions. My learning experience was made possible by the Ontario Jiangsu Educational Exchange.

REFERENCES

1. Fu Weikang. The story of Chinese Acupuncture and Moxibustion. Foreign Languages Press, Beijing, 1988.
2. Cheng Xinnong. Chinese Acupuncture and Moxibustion. Foreign Languages Press, Beijing, 1987.
3. Vincent C, Richardson P. The evaluation of Therapeutic Acupuncture: Concepts and Methods. Pain 1986; 24:1-13.
4. Melzack R, Wall P. Acupuncture and transcutaneous electrical nerve stimulation. Postgraduate Medical Journal 1984; 60:893-896
5. Chapman C, Wilson M, Gehrig J. Comparative effects of acupuncture and transcutaneous stimulation on the perception of painful dental stimuli. Pain 1976; 2:265-270.
6. Anderson C, Jamieson J, Man S. Analgesic effects of acupuncture on the pain of ice-water: a double-blind study. Canadian Journal of Psychology 1974; 28:239-242.
7. Pomeranz B, Cheng R, Law P. Acupuncture reduces electrophysiological and behavioural responses to noxious stimuli. Experimental Neurology 1977; 54:172-177.
8. Sandrew B, Yang R, Wang S. Electroacupuncture analgesia in monkeys: a behavioural and neurophysiological assessment. Archives Internationales de Pharmacodynamie de Therapeutie 1978; 231:274-278.
9. Kerr F, Wilson P, Nijensohn D. Acupuncture reduces the trigeminal evoked response in decerebrate cats. Experimental Neurology 1978; 61:84-86.

Medical Alumni Association

- **THE MEDICAL ALUMNI ASSOCIATION** is the bridge between the graduates and the Faculty of Medicine, University of Toronto.
- The Association provides financial assistance (scholarships, bursaries, travel grants, fellowships loans) for undergraduates, as well as sponsoring programs that are of particular interest – General Practice Panel, Arts and Letters Committee, Undergraduate Affairs, Graduation Banquet, etc.
- At the Faculty level, there are two representatives on the Faculty Council, a representative on the Admissions Committee, and the Chairman of the Student Aid Committee is a representative on the Student Awards Committee.
- At the University level, the Association has two representatives on the University of Toronto Alumni Association, two representatives on the College of Electors, and a representative on the Varsity Fund Executive Committee.
- We are also represented on various Search Committees when Department Chairmen and the Dean of Medicine are being sought.
- The Association is also involved in providing some impetus to five year reunions. Two letters will be sent free of charge, for each class celebrating their reunion. Every attempt is made to keep an up-to-date address list of all our graduates. Please remember to notify YOUR Medical Alumni Association of any address change.

A COMPARISON OF THE EFFICACY OF EPIDURAL ANAESTHESIA IN LABOUR USING THREE DIFFERENT LOCAL ANAESTHETIC SOLUTIONS

Stephen H. Rolbin, M.D.C.M., F.R.C.P. (C), Robin Unger, Philip Hew-Wing, M.D., F.R.C.P. (C), Deena Kapala, and Shyam Radhakrisnan

Department of Anaesthesia, Mount Sinai Hospital, University of Toronto

ABSTRACT

This study compares the efficacy of co-ntinuous epidural anaesthesia during labour using three local anaesthetic solutions. Sixty patients were randomized into three groups and received either: i) bupivacaine 0.25% alone; ii) bupivacaine 0.25% with 1:200,000 epinephrine or iii) lidocaine 1% with 1:200,000 epinephrine. Each anaesthetic solution was assessed for onset, duration of pain relief, degree of motor blockade, effect on labour and effect on fetus and newborn. The results showed that there were no differences between the groups with respect to onset, quality or duration of pain relief. However, motor blockade occurred more commonly in those receiving lidocaine 1% with 1:200,000 epinephrine (p<0.05). Fetal heart rate and newborn Apgar scores were not changed by choice of anaesthetic solution. All three solutions were equally safe and effective.

ABSTRAIT

Cette étude compare l'efficacité d'une anesthésie épidurale continue utilisée durant l'accouchement en employant l'une de trois solutions anesthésiques locales. Soixante patientes furent choisies au hasard pour faire partie de trois groupes et recurent soit, i) bupivacaïne 0.25% simple, ii) bupivacaïne 0.25% avec épinéphrine au 1:200,000 ou iii) lidocaïne 1% avec épinép-hrine au 1:200,000. Chaque solution anesthésique fut evaluée pour le début d'action, la durée du soulagement de la douleur, l'intensité du bloc moteur atteint, l'effet sur l'accouchement et enfin, l'effect sur le foetus et le nouveau-né.

Il n'y avait aucunes différences entre les trois groupes en ce qui concerne le début d'action, la qualité ou la durée du soulagement de la douleur. Cependant, un bloc moteur fut rencontré plus souvent avec celles qui avaient reçu la solution de lidocaine 1% avec épinép-hrine à 1:200,000. (p<0.05).

La fréquence cardiaque du foetus et les valeurs APGAR des nouveau-nés n'ont pas changé par rapport à la solution anesthésique. Toutes les trois solutions étaient sûres et efficaces. La solution lidocaïne 1% avec épinéphrine à 1:200,000 était plus susceptible à causer un bloc moteur.

INTRODUCTION

Epidural analgesia for labour and delivery has gained widespread use because of its effectiveness and its safety. Fetal safety is ensured during epidural anaesthesia when maternal hypotension and large doses of local anaesthetics are avoided[1]. Bupivacaine is the most widely used local anaesthetic agent for epidural anaesthesia in labour. However there are several reports in which inadvertent intravenous bupivacaine resulted in cardiac arrest, hypoxic encephalopathy and/or death[2]. Laboratory investigations have substantiated the increased cardiotoxicity of bupivacaine[3-5]. Protocols to prevent accidental intravenous injection have not been 100 per cent successful. As a result, some investigators have used other local anaesthetic agents and some have added epinephrine to the solution in order to avoid local anaesthetic toxicity[6-8].

The use of epinephrine in obstretical anaesthesia is controversial. Some reports suggest that epinephrine solutions have advantages including: better and long lasting analgesia, less local anaesthetic required for pain relief, and lower plasma levels of the anaesthetic agent[9-11]. Epinephrine, when used in appropriate doses, has no undesirable side effects on the mother or the fetus[12,13]. Nor does it affect the progress of labour[14].

Our study compared the efficacy of two commonly used local anaesthetics in continuous epidural anaesthesia during labour. The effect of added epinephrine was also assessed.

METHODS AND PROTOCOL

Sixty parturients at term, with no obstetric or medical complications, who anticipated normal labour and vaginal delivery, were used in this study. Patients who did not want to be involved in this study, those with contractions less than three minutes apart, those that were too distressed between contractions and those that were to receive sedation or narcotics were not included in this study.

All patients received 500 ml of balanced salt solution prior to epidural anaesthesia and following block were placed in the lateral position. The epidural was performed and an epidural catheter inserted. A test dose of 2 ml of 2% lidocaine HCl was injected through the catheter. After three minutes, if there is no change in heart rate or perception or evidence of anaesthesia, then 10 ml doses of the test solution were injected. Subsequently, the patient was followed and further 10 ml doses of the same local anaesthetic agent were given as needed.

TABLE 1
DEMOGRAPHIC DATA

	Group I	Group II	Group III
Number of Patients	15	15	15
Primipara	12	14	11
Height - cm	160.4 ± 3.8	165.3 ± 8.9	164.3 ± 5.6
Weight-kg	74.8 ± 13.0	74.5 ± 11.5	79.1 ± 12.3
Gestational Age (wks)	40.2 ± 1.2	40.1 ± 1.4	39.8 ± 1.2
Cervical Dilatation - cm	3.2 ± 2.1	3.1 ± 1.8	4.8 ± 2.0
Birth Weight - gms	3594 ± 645	3536 ± 356	3464 ± 3 11

The descriptive data for each group of patients were analyzed by one-way analysis of variance. Data is presented as X ± SD.

In a randomized manner, the patients were assigned to one of three groups :

Group I: Bupivacaine 0.25% alone

Group II: Bupivacaine 0.25% with 1:200,000 epinephrine

Group III: Lidocaine 1% with 1:200,000 epinephrine

The patients did not know which anaesthetic solution they received. Each patient was assessed for : (i) onset of pain relief; (ii) duration of pain relief; (iii) degree of motor blockade; (iv) incidence of hypotension; (v) effect on labour; and (vi) maternal satisfaction. The fetus was assessed by continuous fetal heart monitoring for 30 minutes prior to and 60 minutes after each dose given. Uterine activity was followed by tocodynometry, and the fetal heart was monitored and recorded either externally or by scalp electrode. In addition, the newborn's well-being was assessed by Apgar scores at one and five minutes of age.

Onset was defined as the time from completion of the true injection to when the patient replied that her contraction was not painful. Duration of action was defined as the time between onset and when contractions again became painful. Uterine

contractility was assessed by recording the duration of the first and second stage of labour. The progress of dilatation was calculated in cm/hr. The time interval from initiation of the epidural to delivery was also recorded. Maternal satisfaction was recorded using a scale rating 0 for no pain relief to 4+ representing excellent pain relief. Motor blockade was tested objectively, according to the following criteria: Nil, if there was free movement of legs and feet; partial, if the patient was just able to flex knees; almost complete, if unable to flex knees but with free movement of feet, or complete, if no movement was possible[15]. Since the degree of motor block is often asymmetrical, both legs were assessed and the greater degree of motor block in either leg was used for statistical analysis.

Demographic data was compared using one-way analysis of variance. The remaining data was analysed for statistical significance ($p<0.05$) using Chi-square analysis (with the Yates correction for continuity for 2x2 matrices) and the Bonferroni correction for multiple comparisons.

RESULTS:

There were no differences between the groups with respect to height, weight, parity, gestational age or cervical dilatation at the time of epidural catheter insertion (Table I). There were no differences between groups in maternal blood pressures after the epidural was given. Only one patient received ephedrine and she was in group I.

There were no differences between groups with respect to onset or quality of pain relief. Motor block occurred more commonly in those patients receiving lidocaine 1% with 1:200,000 epinephrine ($p<0.05$) (Table 2).

There were no significant differences between the groups for the duration of pain relief. This was true for the initial doses when analysed alone or when all subsequent doses were analysed (Table 2). There were three patients in Group I; six patients in Group II and five patients in Group III who delivered without the need for subsequent epidural analgesia. The results were not significant.

There were no differences between the groups with respect to the number of patients receiving pitocin, the duration of the first stage or second stage of labour, the progress of dilation, the time interval between epidural placement and delivery and the method of delivery (Table 3). When the primipara were analysed separately, there were no differences detected between groups.

There were also no significant changes within each group for fetal heart rate, variability, incidence of variable or late decelerations when comparing fetal heart rate traces before and after epidural injection. The newborn weight and Apgar scores at one and five minutes of age were all 7 or greater.

TABLE 2
CHARACTERISTICS OF EPIDURAL BLOCK

	Group I	Group II	Group III
Time to Pain (1st dose)	10.7 ± 9.3	11.7 ± 6.0	13.3 ± 7.0
Sensory Block (% of pts.4+)	97	87	86
Motor Block* *(% with free movement of legs as feet)*	97	97	81
Duration of Initial Dose (min)	124.1 ± 37	155.6 ± 56	115.5 ± 44
Duration of Initial Dose (min)	127.1 ± 42	140.5 ± 56	107.6 ± 48

Data is presented as X ± SD. Analysis for statistical significance was by Chi-square analysis (with the Yates correction for continuity for 2 x 2 matrices) and the Bonferroni correction for multiple comparisons. $p < 0.05$ was considered significant.

DISCUSSION:

Pain relief in labour has been described as a luxury, and therefore it is essential that the technique and drugs used are safe for mother and fetus. Epidural anaesthesia is widely used for pain relief in labour and produces greater patient satisfaction than other forms of pain relief in labour[1]. There is controversy as to which local anaesthetic is best for labour. Our study compared the efficacy of three commonly used anaesthetic solutions. We also addressed the question of fetal and newborn safety.

Bupivacaine and lidocaine are most commonly used in Canada. Bupivacaine is more cardiotoxic than other local anaesthetic agents[2-5]. As a result, local anaesthetic agents have been

tried and in some instances epinephrine was added to the solution to decrease local anaesthetic toxicity[6-8].

Animal studies have shown that bupivacaine may be 100 times more cardiotoxic than lidocaine[16]. Ventricular fibrillation occurred in approximately 25% of unanaesthetized dogs given a convulsant dose of bupivacaine[17]. No arrythmias occurred when the same dogs were given a convulsant dose of lidocaine[17]. It has also been reported that convulsant and supra-convulsant doses of bupivacaine but not lidocaine, produce ventricular arrythmias in the awake cat[18].

Scanlon et al reported that lidocaine when used for epidural anaesthesia in labour caused neurobehavioural changes in the newborn[21,22]. These studies suggested that newborns of mothers who received epidural lidocaine or mepivacaine had lower scores on tests of muscular strength and tone than did infants whose mothers did not receive epidural anaesthesia. This led to the decreased usage of lidocaine in obstetric anaesthesia in the U.S.A. but not in Canada. However, recent studies have not substantiated the adverse effects of lidocaine[20]. Babies score equally well with lidocaine or any other local anaesthetic agent. Currently,

TABLE 3

THREE COMMONLY USED LOCAL ANAESTEHTIC SOLUTIONS EFFECTS ON LABOUR AND DELIVERY.

	Group I	Group II	Group III
First Stage (5-10 cm) (Minutes)	216 ± 152	179 ± 113	224 ± 123
Second Stage (Minutes)	71.4 ± 42	78.4 ± 49	92.3 ± 69
Progress of Dilation (cm/hr)	3.3 ± 2.7	2.8 ± 1.7	2.4 ± 1.6
Epidural to Delivery Interval (Minutes)	294 ± 201	294 ± 156	232 ± 90
Method of Delivery:			
Mid Vacccum or Mid Forceps	0	2	1
C-Section	5	2	4

Data is presented as X ± SD . Analysis for statistical significance was by Chi-square analysis (with the Yates correction for continuity for 2 x 2 matrices) and the Bonferroni correction for multiple comparisons. A $p < 0.05$ was considered significant.

The cardiotoxicity of bupivacaine may be due to its action on cardiac sodium channels. Both lidocaine and bupivacaine block the sodium channels of nerve and heart membrane. These channels are responsible for fast conduction. Therefore, the blockade of sodium channels slows or stops conduction. This is the suggested mechanism by which local anaesthetics affect the nerve membrane. Animal studies have shown lidocaine enters the cardiac sodium channels quickly and leaves quickly while bupivacaine enters the channel quickly but is slow to leave[19]. Thus bupivacaine is a potentially dangerous cardiac toxin. It also causes more potent depression of myocardial contractility[16].

Bupivacaine (0.125-0.5%) continues to be the most commonly used local anaesthetic for pain relief in labour. This is because it produces analgesia with minimal motor blockade and has a relatively long duration of action. However, the lower concentration of bupivacaine does not eliminate the possibility of cardiac toxicity[20]. Cardiac arrests have occurred with 0.5% and even 0.25% solution[20].

lidocaine is considered a satisfactory choice for continuous epidural anaesthesia in labour. We believe, therefore, it should be more widely used, especially because of its lack of cardiac toxicity.

The use of epinephrine in obstetrical anaesthesia is controversial. Epinephrine containing solutions provide more satisfactory and longer lasting pain relief, and less local anaesthetic is required[9-11]. This results in lower plasma levels of local anaesthetic[10-12]. Furthermore, epidural epinephrine does not alter intervillous blood flow during epidural anaesthesia[12].

The use of epinephrine in epidural anaesthesia has been a common practice for caesarean delivery. In these circumstances, 100 μgm or more of epinephrine does not decrease uteroplacental blood flow or cause fetal stress or distress[12]. There are, however, significant differences in maternal or neonatal lidocaine concentrations, associated with the addition of epinephrine[14]. Epinephrine theoretically, may prolong labour but at the dose used with local anaesthetic for labour, it has not been shown to affect

the progress of labour[14,23]. Our data substantiate these observations.

We found no significant difference in the duration of the epidural block with bupivacaine 0.25% alone, bupivacaine 0.25% with 1:200,000 epinephrine, or lidocaine 1% with 1:200,000 epinephrine. The duration of the initial dose was approximately half an hour longer when epinephrine was added. This is significant at the $p<0.10$ level but because of the large variation within each group, the difference is clinically not significant. Bupivacaine 0.25% with 1:200,000 epinephrine did not provide longer and more consistent pain relief.

Abboud et al. concluded that the addition of epinephrine (1:300,000) to bupivacaine or lidocaine had no adverse effects on either mother, fetus, newborn or duration of labour[14,23]. Our study failed to confirm the longer duration of action when epinephrine is added to bupivacaine or lidocaine[14,23,24]. There appears to be no explanation for this discrepancy. Perhaps the sample number in the present study was small and the large variability that we observed in the duration of pain relief results in a difference that is not significant. Patient expectations may also have been different in the various institutions where the studies were done.

Lidocaine 1% with 1:200,000 epinephrine did result in greater motor blockade. The lack of leg weakness with bupivacaine with or without 1:200,000 epinephrine is an advantage. All three anaesthetic solutions tested had no effect on progress of labour, method of delivery, or fetal heart rate patterns.

In conclusion, although lidocaine 1% with 1:200,000 epinephrine is a safe alternative to 0.25% bupivacaine it does cause greater motor blockade and the clinician must assess whether or not this is acceptable. In addition, the safety of the addition of epinephrine 1:200,000 has been substantiated.

REFERENCES

1. Shnider SM, Levinson G, Ralston DH. Regional anaesthesia in labour. In Anaesthesia for Obstetrics, 2nd Edition. William and Wilkins, Baltimore, 1987. pp109-122.
2. Albright GA. Cardiac arrest following regional anaesthesia with lidocaine or bupivacaine. Anaesthesiology 1979; 51: 285-287.
3. Tanz RD, Heskett T, Loehning RW, Fairfax CA. Comparative cardiotoxicity of bupivacaine and lidocaine in the isolated perfused mammalian heart. Anaesth. Analg. 1984; 63: 549-556.
4. Kotelko DM, Shnider SM, Dailey PA, Brizgys RV, Levinson G, Koche M. Bupivacaine induced cardiac arrythymias in sheep. Anaesthesiology 1984; 60:10-18.
5. Rosen MA, Thigpen JW, Shnider SM, Foutz SF, Levinson G, Koche M. Bupivacaine-induced cardiotoxicity in hypoxic and acidotic sheep. Anaesth. Analg. 1985; 64:1089-1096.
6. Moore DC, Batra MS. The components of an effective test dose prior to epidural block. Anaesthesiology 1981; 55: 693-696.
7. Dain, S, Rolbin S, Hew E. The epidural test dose in obstetrics: is it necessary? Can. J. Anaesth 1987; 34: 601-605.
8. Wilson CM, Moore J, Ghaly G, Flynn R, McLean E, Dundee JW. Plasma concentrations of bupivacaine during extra-dural anaesthesia for caeserean section: The effect of adrenaline. Anaesthesia 1988; 43: 12-15.
9. Mather LE, Tricher GT, Murphy TM et al. The effects of adding adrenaline to etidocaine and lignocaine in extradural anaesthesia: II Pharmacokinetics. Br. J Anaesth. 1976; 48:989-993.
10. Bromage PR. Epidural Analgesia. Saunders, Philadelphia, 1978, pp. 358-360.
11. Abboud TK, Sheik-ol-Eslam A, Yanagi T, et al. Safety and efficacy of epinephrine added to bupivacaine for lumbar epidural analgesia in obstetrics. Anaesth. Analg. 1985; 64: 585-591.
12. Albright GA, Joupila R, Hollman AI, Joupilla P, Vierola H, Kiovula A. Epinephrine does not alter human intervillous blood flow during epidural anaesthesia. Anaesthesiology 1981; 54: 131-135.
13. Giles WB, Lah FX, Trudinger BJ. The effect of epidural anaesthesia for caesarean section on maternal uterine and fetal umbilical artery blood flow velocity wave forms. Br. J Ob. Gyn. 1987; 94: 55-59.
14. Abboud TK, Sheik-ol-Eslam, Yanogi T, Murakawa K, Costasndi J, Zakarian M, Hoffman D, Haroutunian S. Safety and efficacy of epinephrine added to bupivacaine for lumbar epidural analgesia in obstetrics. Anaesth. Analg. 1985; 64:585-591.
15. Bromage PR. In: Epidural Analgesia. W.B. Saunders, Philadelphia, 1978, pp. 144.
16. Sage DJ, Feldman HS, Arthur GR, Datta S, Ferretti AM, Norway SB, Covino BG. Influence of lidocaine and bupivacaine on isolated guinea pig atria in the presence of acidosis and hypoxia. Anaesth. Analg. 1984; 63:1-7.
17. Sage DJ, Feldman HS, Arthur GR, Doucette AM, Norway SB, Covino BG. The cardiovascular effects of convulsant doses of lidocaine and bupivacaine in the conscious dog. Reg. Anaesth. 1985; 10: 175-183.
18. De Jong RH, Ronfeld RA, de Rosa RA. Cardiovascular effects of convulsant and supra-convulsant doses of amide local anaesthetics. Anaesth. Analg. 1982; 61:3-9.
19. Clarkson CW, Hondeghem CM. Mechanism for bupivacaine depression of cardiac conduction: Fast block of sodium channels during the action potential with slow recovery from block during diastole. Anaesthesiology 1985; 62: 396-405.
20. Levinson G., Shnider SM. Choice of local anaesthetics in obstetrics. Part 2: Controversies in Selecting a Drug in Anaesthesia for Obstetrics, 2nd Edition. William and Wilkins, Baltimore, 1987; pp. 69-78.
21. Scanlon JW, Brown WU, Weiss JB, Alper MH. Neurobehavioural responses of newborn infants after maternal epidural anaesthesia. Anaesthesiology 1974; 40:121-128.
22. Scanlon JW, Ostheimer GW, Lurie AO, Brown WU, Weiss JB, Alper MH. Neurobehavioural responses and drug concentrations in newborns after maternal epidural anaesthesia with bupivacaine. Anaesthesiology 1976; 45: 400-405.
23. Abboud TK, David S, Nagappala S, Costandi J, Yanagi T, Harowtumian S, Yeh SU. Maternal, fetal and neonatal effects of lidocaine with and without epinephrine for epidural anaesthesia in obstetrics. Anaesth. Analg. 1984; 63:973-979.
24. Eisenach JC, Grice SC, Dewan DM. Epinephrine enhances analgesia produced by epidural bupivacaine during labour. Anaesth. Analg. 1987; 66: 447-451.

The U of T Medical Journal will award the following prizes for outstanding articles published in the Journal:

1. The *University of Toronto Medical Journal Prize* for Literary Excellence consisting of $100 for the best article and $50 for the two next best articles.
2. The *R.I Harris Award* for the best article in the field of Orthopedics.
3. The *Gladstone Award* consisting of $100 and a certificate for the best article in the fields of Neuroscience.

Organ Transplantation: Issues in Jewish Biomedical Ethics

Alden J. Pearl, B.Sc., 9T1

ABSTRACT

The transplantation of human organs has captured world attention over the last forty years. These operations have raised many moral, theological, legal, social and philosophical problems which need to be addressed from different perspectives. This paper presents the traditional Jewish teachings with respect to organ transplantation.

ABSTRAIT

Au cours des derniers 40 ans, la transplantation des organes humains a captivé l'attention du monde. Avec ces opérations, des questions se concernant de moralité, de théologie, de légalité, de socialité et de philosophie ont été amenées et ont besoin d'être adressées en regardant différentes perspectives. Cette revue présente les préceptes juifs traditionnels envers la transplantation des organes.

An established principle of Jewish teaching is the permission for the physician to heal and the commandment to save life: the one who refrains from healing is shedding blood, even if other physicians are available (Shulhun Aruch-Yoreh De'ah 366:1). Consequently, the physician's freedom of action may be far broader than that of any other in society, including parents who are permitted to discipline children and the court official whose duty it is to mete out punishment. The physician is obligated to perform many actions which are ordinarily considered assault including any type of incision and the administration of potentially lethal drugs, provided they are designed to save the patient's life. However, a difference between the duties of the physician and the court official is that if an accused should accidentally die at the hands of the court official, the court official is blameless (Maimonides, Mishneh Torah-Hilchot Rozeah 5:6-7). If a patient dies as a result of physician error, the physician is deemed an unintentional killer and is subject to the laws of exile (Shulhun Aruch-Yoreh De'ah 336:1). The physician's near-complete control over the treatment of the patient and the fact that any error in judgment may result in the patients death, renders the physician liable as an unintentional killer.

In determining if a physician has erred, an *a priori* definition of correct procedure must be established. Unfortunately, the rapid progression of modern medicine precludes a definition of correct medical technique. According to Maimonides (Shulhun Aruch-Moreh Nevukhim 3:37), any medical practice is acceptable provided it has proven effective in practice even though it may not be understood and it follows as a rational deduction from accepted physical theory. With this definition, it is assumed that the physician has meticulously examined the patient and has sought the

opinions of peers. Such professional advice is a necessity given that two patients are likely not to respond equally to transplant procedures.

There are issues concerning the transplant recipient primarily, whether one receives an organ from a living or a dead donor. It is known that it is not proper to wound oneself (Babylonian Talmud-Babba Kama 91b; Maimonides, Mishneh Torah-Hilchot Shevuot 5:17 and Hilchot Mazik 5:1) but does this concept apply to the surgical incision of a transplant? Furthermore, does the recipient transgress the commandments of "Take heed to thyself and keep thy soul diligently" (Deuteronomy 4:9) and "Take ye therefore good heed unto yourselves" (Deuteronomy 4:15) which are interpreted as the removal of all physical danger to one's body (Babylonian Talmud-Berachot 32b and Maimonides, Mishneh Torah-Hilchot Rozeah-u-Shemirat ha-Nefesh 11:4)?

Regarding the recipient's diseased organ, there arises the problem concerning the burial of the 'old' organ. Thus a heart, kidney, lung or other diseased organ may require burial by Jewish law[1]. Regarding the recipient's newly donated organ, there is a question of the status of this organ. When the recipient dies, does this 'new' organ revert back to the original owner?

Although there are many considerations from the traditional Jewish viewpoint concerning the organ recipient, the majority of questions concern the donor. From the biblical passage "His body shall not remain all night upon the tree but they shall bury him on that day" (Deuteronomy 21:23), Jewish law is very strict in the prohibition of mutilating the dead body, deriving any benefit from the dead and delaying the burial of the dead. However, it is clear that where there is an immediate possibility of saving a life, the commandment to save life makes it not only permissible, but even obligatory, to suspend all prohibitions. It goes without saying that in removing an organ, meticulous care must be taken to avoid unnecessary mutilation[2].

Finally, the most thought-provoking question concerns the establishment of the death of the donor. Since the chances of successfully resuscitating a transplanted organ diminish with time, it is imperative that the criteria for death be defined in order that physicians not be accused of 'organ snatching[2]. Such an act would transgress the commandment "Thou shalt not kill" (Exodus 20:13 and Deuteronomy 5:17) and would constitute murder. It would also contradict the physician's basic obligation (Babylonian Talmud-Bava Kamah 85a and Shulhun Aruch-Yoreh De'ah 336:1) to heal "And heal he shall heal" (Exodus 21:19). The classic biblical definition of death is based on the following: all biological functions, as determined by the gross senses, have ceased and although the body may exhibit post mortem spasms, it can no longer be restored to function as an organism[2]. While the first condition is fixed, the second is subject to constant change based on medical advancements such as organ transplantation.

CORNEAL TRANSPLANTS

Although most modern rabbinic literature concerning organ transplants deal with corneal transplants, their concepts apply to almost all other transplants. The most respected opinion of the modern era is that of the late Chief Rabbi of Israel, Rabbi Unterman[3]. Rabbi Unterman stated that the prohibitions relating to the dead are all set aside in the event where a life may be saved - "Pikkuah Nefesh". Therefore, the prohibitions would stand if there is no threat to life such as a transplant for cosmetic reasons. The question then arises: is a corneal transplant in the category of Pikkuah Nefesh?[1] Citing a Talmudic passage (Avodah Zarah 28b), Rabbi Unterman perceives that eye damage constitutes Pikkuah Nefesh as one may desecrate the Sabbath (the holiest of days) to save an eye. Although the Talmudic case deals with preventing blindness and modern transplants attempt to restore vision, blindness is considered life threatening (as the blind may fall down a set of stairs and die). As a true case of Pikkuah Nefesh, the prohibitions relating to the dead are put aside.

What about a person suffering from unilateral blindness which is not considered Pikkuah Nefesh; on what grounds would corneal transplants be permitted? Rabbi Unterman responded that once the cornea is transplanted, it is no longer a dead organ but is again living. Hence the prohibitions of deriving benefit and delaying of the burial of the dead no longer apply - no dead organ is involved. Concerning the prohibition against ritual defilement (Maimonides, Mishneh Torah-Hilchot Tamat 3:1 and Shulhan Aruch-Yoreh De'ah 369:1) it does not exist as it only relates to a dead organ or body (Babylonian Talmud-Niddah 70b). However, the prohibition, that of the desecrating the dead, remains as one must make an incision into the cadaver to obtain the eye and the concept of Pikkuah Nefesh does not hold. According to Rabbi Unterman, only a visible incision represents a true desecration and since the eyes of the dead are closed, the removal of one or both eyes would be permitted.

Rabbi Glickman adds[4] that one may perform a transplant only if the donor gave permission prior to death. If previous permission was not granted, then the donor may not atone for sins in the afterlife because organs remain alive. By granting permission, the donor has performed a charitable act and has voiced acceptance of the delaying of atonement until the death of his/her organ in the recipient's body.

Rabbi Greenwald states that the prohibition relating to the derivation of benefit from the dead applies only to the flesh and organs and not to the skin[5]. Furthermore, one cannot remove the whole eye but only the cornea for implantation since it is considered skin and not flesh (Babylonian Talmud-Niddah 55a).

Regarding eye banks and whether the permissibility or cornea transplants only applies to an immediate transfer or a later transfer from an eye bank is addressed by Rabbi Steinberg[6]. Since the permissibility of organ transplants lies chiefly with the concept of Pikkuah Nefesh, it would seem that the recipient would have to be immediately at hand, suggesting that the storing of eyes is prohibited. Rabbi Steinberg responds that since the number of blind is so great, it is as if there is always an available recipient.

Most authorities seem to agree that it is permissible for one to donate not only their eyes but any organ for later use. With today's rapid retrieval systems, this may not be an issue for Jewish

law. However, the issue of organ banks for long-term storage still is controversial. The only point where most agree on long-term storage is regarding blood donations to blood banks. These are permissible as the risk is minimal, the blood is almost assured to be used and the blood, unlike other organs is regenerated.

KIDNEY TRANSPLANTS

The principles relating to corneal transplants are equally applicable to kidney transplants. Generally, a kidney transplant is only undertaken when both kidneys of the recipient are so diseased that life cannot continue. Since such a situation is considered Pikkuah Nefesh, all rabbinic authorities set aside the prohibitions relating to the dead donor.

However, with kidney transplants, physicians not only use cadaver kidneys, they also use kidneys from live donors. It follows that if one may not set aside one person's life for another (Maimonides, Mishnah Torah-Hilchot Rozeah-u-Shemirit ha-Nefesh 1:9, Mishnah Oholot 7:6 and Shulhan Aruch-Yoreh De'ah 425:2), may one endanger his/her own life by donating a kidney in the chance of saving another's life. Rabbi Jakobovits[7], based on an obscure passage in the Jerusalem Talmud and the biblical commandment of "Thou halt not stand upon the blood of thy neighbour" (Leviticus 29:16), states that a donor may endanger his/her life to supply a redundant organ to an individual only if the possibility of saving that life is much greater than the risk to the donor. Similarly, Rabbi Waldenberg concludes that such transplants are allowed only if a group of reliable physicians believe that there is no danger posed to the donor's health[1]. Interpreted literally, Rabbi Waldenberg's [8] viewpoint seems impractical based on the fact that there is always a small risk to the donor involved in such an operation. Hence, Rabbi Waldenberg must mean to say that a kidney donation must be undertaken on a voluntary basis.

The majority of rabbinical authorities agree that a small risk may be incurred by the donor provided the chances of success are substantial. Even a major risk may be taken in order to save an individual's life[1].

HEART TRANSPLANTS

In transplanting a heart, all rabbinical authorities agree that the prohibitions relating to the dead and ritual defilement are set aside by the concern of saving a life, Pikkuah Nefesh. The only remaining issue pertains to the establishment of the donor's death[1]. There are many types of death: intellectual death when a person's intellect ceases to function; social death when a person can no longer function in society; spiritual death when the soul leaves the body; and physiological or medical death. As previously noted, the scholarly interpretation of death is the cessation of all biological functions where it is impossible to resuscitate the individual.

Rabbinical scholars [9] have permitted heart transplants providing the death of the donor has been established. Although the definition of death occurs when respiration ceases, the unexplained death of a young or healthy individual should be followed by accepted resuscitative practices. However, a terminally ill patient whose disease processes cannot be changed, must not be hastened to death, but, by the same token, must not be resuscitated when respiration ceases (Babylonian Talmud-Sabbath 15b, Sulhan Aruch-Yoreh De'ah 339, Maimonides, Mishneh Torah-Hilchot Avelf and Mishnah Semachoth 1:2). Additionally, consent from the donor and/or the donor's family must be obtained, so that the physician and the recipient do not run the risk of transgressing the commandment of "Thou shalt not steal" (Exodus 20:13 and Deuteronomy 5:17).

In general, transplants may not be religiously approved until there is conclusive proof that the chances for the recipient's survival are greater than those for failure. Such seems contradictory to views which allow a sick person to submit to very dangerous surgery or medication if there is a small chance for cure even if the treatment risk is much greater than that of a cure. Rabbi Unterman sees no contradiction, since the recipient of a new heart is in a unique situation. When the diseased heart is removed and before the new one is implanted, the recipient is assumed to have lost hold on life or "Hezkat Hayyim". The concept of Hezkat Hayyim is brought forth in the Talmud of Gittin 28a where it explains that if a messenger brings a divorce from a distant place and the husband was old or sick preceding the messenger's exit, then he must deliver it to the wife on the presumption that the man is still alive when it is delivered. Hence, unless conclusive information to the contrary is available, a person retains hold on life until death is pronounced. Once the transplant recipient loses the presumption of still being alive, he/she is no longer permitted to risk his/her life unless the chances for success are greater than those for failure. Similarly, a person dying of cancer never loses Hezkat Hayyim and may subject oneself to any risk no matter how great, even if there is a minimal chance for a cure[1,2].

It is evident from all Talmudic rulings that the heart is essential to life. The heart is the seat of life: its removal causes one to lose one's hold on life. From this, Rabbi Unterman concludes that removing a recipient's old heart removes one's Hezkat Hayyim and a heart transplant can only be approved if the risk of death from the operation is estimated to be smaller than the possibility of success. With regards to risk from treatment, a parallel is seen in the case where one is obliged to rescue someone from a collapsed building even by desecrating the Sabbath (Babylonian Talmud-Yoma 85a, Maimonides, Mishneh Torah-Hilchot Sabbath 2:19, Mishnah-Yoma 8:6-7 and Shulhan Aruch-Orah Hayyim 329:4), since such an individual retains his/her Hezkat Hayyim until proven otherwise. Similarly, one suffering from an incurable illness may undertake potentially lethal treatment provided that there is a small chance that a cure might be obtained. Again, the patient has never lost Hezkat Hayyim.

The concept regarding the loss of one's hold on life once the diseased heart is removed raises questions on the status of the 'lifeless' recipient. Rabbi Rosenfeld[10] concludes that although one may be considered lifeless during the period between heart exchanges, one is not considered dead. Therefore, one who has only lost his/her Hezkat Hayyim temporarily cannot be consid-

ered to have lost his/her previous status as a spouse or parent (there would be issues of family law if the converse were true). In this regard, Rabbi Jakobovits addresses [11] whether it is permissible to artificially prolong the donor's life in order to preserve the heart and effect a transplant and, having done so, may one 'turn off' the artificial respirator, effectively manipulating the life and death of the donor?

Among those who have condemned heart transplants are Rabbi Weiss and Rabbi Feinstein[12,13]. It is Rabbi Feinstein who considers this practice to involve a double murder especially if the donor's death is not confirmed according to all medical and legal criteria. Concerning the recipient, when cardiac transplantation and, for that matter, any other organ transplantation becomes an accepted therapeutic procedure with a relatively high chance for success, then murder would no longer be a consideration. It would seem that the majority of contemporary rabbinical opinion regarding heart transplantation is that the procedure may be religiously sanctioned, provided the donor was definitely dead when the heart was removed.

CONCLUSIONS

Although many problems such as the availability of organs, tissue typing and rejection control still remain to be solved, it is evident that over the last decade, the total number of organ transplants performed have risen dramatically. While new and revolutionary medical techniques have been developed, older techniques have been refined to the point where the survival rate of most transplant recipients has also risen.

Although kidney and heart transplants are quite successful in prolonging, if not saving, an individual's life, there are other transplants which are still considered risky (i.e., lung or liver). The newer transplants (i.e., pancreas, bowel and artificial heart or lung) are still experimental and have been performed on few patients. Jewish teaching has yet to address this area.

In terms of religious Jewish teaching, it would seem that there are a number of questions pertinent to all organ transplants. First, when dealing with a cadaver donor, does one transgress the fundamental prohibitions relating to the dead when an organ is used? Second, does one become impure during the procedure? Third, if the organ that is removed must still be functioning and exhibit some degree of 'life', is the donor really dead or was he/she murdered by the physician removing the organ? And finally, regarding transplanting organs from live donors, can one subject oneself to the high risk of the medical procedure even if the success or survival rate is minimal? Although there are more specific questions and many problems relating to organ transplants, the above are issues which must be addressed.

The basic tenet of Judaism is the supreme value of human life. To save a life is to save the life of a nation, as one individual may be the source of an entire nation. Consequently, life's value is absolute and supreme[14]. This is due in part upon the belief that people are created in the image of God. As a result, most authorities agree that when a person's life is in danger, any act which may prolong life, even if for a very short time, supersedes all biblical commandments except for three: idolatry, murder and adultery[2]. Since the practice of organ transplantation is definitely considered an action which may prolong life, it would follow that organ transplants are permissible.

The present era of medicine has introduced a literal interpretation to the words of Ezekiel: Get yourself a new heart....why should you die? (Ezekiel 18:31). In fact, it seems that Ezekiel's prophecy refers directly to humanity's most recent medical advancement, organ transplants, where he says: And a new heart will I give you and a new spirit will I put within you, and I will take the stone heart out of your flesh and I will give you a heart of flesh (Ezekiel 11:19 and 36:26). Although purely a figurative and spiritual reference, it seems to vividly depict the present epoch of organ transplantation.

REFERENCES

1. Rosner F. Modern Medicine and Jewish Law. New York: Balshon Printing & Offset, 1972.
2. Bleich JD, Rosner F. Jewish Bioethics. New York: Sanhedrin Press, 1979.
3. Unterman IY. Shevet mi-Yehudah, 1955: Jerusalem, pp. 313-322.
4. Glickman I. Regarding the law of grafting organs from the dead onto the sick, No'am, vol. 4: Jerusalem 5721 (1961) pp 206-217.
5. Greenwald JJ. Kol Bo al Avelut, vol. 1: New York, 1947, pp 45-58.
6. Steinberg M. In the matter of grating and eye from the dead to a blind person, No'am, vol. 3: Jerusalem 5720 (1960), pp 87-96.
7. Jakobovits I. Jewish Medical Ethics. New York, Bloch Publishing Company, 1975.
8. Waldenberg Y. Whether there is an obligation or any sort of commandment for a healthy person to donate one of his organs for transplantation into the body of a dangerously ill person and to thereby save the latter from death. Responsa Ziz Eli'ezer, vol. 9, no. 45: Jerusalem, 1967, pp 179-185.
9. Unterman IY. Points of halachah in the question of heart transplants from a lecture to the Congress of Oral Law, Jerusalem, August 1968.
10. Rosenfeld A. Refrigeration, resuscitation and the resurrection. Tradition, vol. 9, no. 3: Fall 1967, pp 82-94.
11. Jakobovits I. Medical experimentation on humans in Jewish law. Proceedings of the Association of Orthodox Jewish Scientists, 1966 (see Jewish Bioethics pp 377-384).
12. Weiss IJ. Whether it is permissible to transplant the heart of a sick person about to die into another ill person as therapy, Ha-Ma'or, no. 178: August/September 1968, pp 3-9.
13. Feinstein M. Final legal judgment in the matter of heart transplantation, Ha-Pardes, March/April 1969, p 4.
14. Rosner F. Jewish Ethical Issues in Hazardous Medical Therapy, Tradition, (Spring 1981), pp 55-58.

Palliative Care: A Patient-Centred Approach To Medicine

Jeffrey Handler, M.Sc., 9T2, Claire Robertson, B.Sc., 9T2 and Edward Gutman, M.D. 8T2, C.C.F.P.

ABSTRACT

Caring for patients with a terminal illness requires a patient-centred approach involving a multidisciplinary health team. The medical and psychosocial needs of the patient, as well as the needs of the family must be addressed. Palliative care is an important approach to medicine for medical students to appreciate.

ABSTRAIT

Soigner des patients avec des maladies incurables requiers une équipe de soins multidisciplinaire employant une approche centrée sur le patient les besoins médicaux et psychosociaux du patient ainsi que ceux de la famille doivent être abordés. Les soins palliatifs comprennent une partie importante de la médecine et ainsi, demande l'appréciation des étudiants en médecine.

As the elevator doors open on 6 West at Baycrest Hospital, one is met by an unexpected sight. In the recreation area the sun shines through the large wall to wall windows. Mrs. F.N. shuffles in to finish potting flowers. Nearby, a physiotherapist leads a wheelchair-bound group of elderly patients through stretching exercises. During morning rounds, Mrs. S.G. is found cheering for Italy during a soccer match that she watches on television. Mrs. R.S. is not in her room...she has gone down to the kitchen to bake. The essence of life is felt everywhere in this palliative care unit where patients have an average life expectancy of less than three months from the date of their admission.

Caring for people is the fundamental cornerstone of medicine. However, caring for people who are dying requires a unique holistic approach termed palliative care. The goals of this approach are to maintain optimum quality of life and to relieve distressing physical and psychological symptoms. Active intervention to prolong life is not a part of the palliative care agenda[1]. For the second year medical students, who spent a summer at the Baycrest Centre for Geriatric Care, the palliative care unit provided a unique learning experience. The following case history illustrates the important medical and non-medical aspects of this experience.

Case History: *Mrs. R.G. was a 59 year old recently widowed, former school teacher. In July 1987 she visited her family doctor complaining of sweating, chills and abdominal bloating. Following investigation, a diagnosis of ovarian carcinoma was made and she was treated with both surgery and chemotherapy. In April 1990 she developed nausea and vomiting secondary to small bowel obstruction. Further investigation revealed extensive metastatic spread of the tumour. Her respiratory and swallowing functions were deteriorating and, after consultation with the patient and her two children, Mrs. R.G. was admitted to the Palliative Care Unit at Baycrest Hospital in June 1990. She was given anti-emetics, non-narcotic analgesics and morphine, when necessary, to control her nausea and pain. She developed dyspnea, severe ascites and peripheral edema. Toward the end of her illness, she became confused, restless and agitated. Her pain was controlled with a continuous subcutaneous infusion of morphine and her agitation was relieved with chlorpromazine. She died quietly with her children at her bedside.*

Palliation involves whole person care addressing the medical, psychological and social needs of the individual, as well as the needs of the patient's family.

Foremost among the patient's medical needs in palliative care is pain control. A thorough history is crucial for directed pain management. In addition to characterizing the nature of the pain, the impact on daily living and the effectiveness of previous therapies should also be noted. A physical examination of the patient and interview of family members are useful, but are often neglected. Non-narcotic analgesics such as acetylsalicylic acid, acetaminophen and other non-steroidal anti-inflammatory drugs are first line agents; however, their long-term use is limited by gastrointestinal side effects. If pain control is not achieved with non-narcotics, weak narcotics such as codeine are added and, ultimately, narcotic analgesics such as morphine are used. Certain side effects are commonly seen with the use of narcotics. For example, constipation predictably occurs and must be anticipated. Because tolerance to constipation does not develop, a regimen that may include bowel stimulants (e.g. magnesium hydroxide) or osmotic laxatives (e.g., lactulose) is indicated at the onset of therapy. The sedating effects of narcotics tend to diminish once pain control has been achieved due to the development of tolerance. Excessive drowsiness may indicate that the dosage is too high. Respiratory depression is infrequent in the palliative care setting because it is rarely seen with long-term narcotic therapy or in situations where tolerance has developed[2].

The appropriate management of dyspnea, vomiting and dehydration is a major palliation concern. Pleural effusions secondary to primary or metastatic carcinoma are often observed in palliative care patients; thoracocentesis can provide immediate relief of associated dyspnea and discomfort. Bronchodilators, steroids, narcotics and anticholinergic agents (e.g. atropine) are used frequently to relieve dyspnea due to other causes. Nausea and vomiting related to malignant bowel obstruction can be managed with mouth care to relieve thirst, oral intake as tolerated and liberal use of anti-emetics. Dehydration is a concern for many patients

"Consider first the well-being of the patient."

Roche®

Original Research in Medicine and Chemistry

In a world where dedication makes the difference, we recognize yours. CONGRATULATIONS!

Glaxo Canada Inc.

when oral intake declines as the illness progresses. The resulting sensation of thirst is unpleasant and should be treated with mouth washes every two hours along with fluid sips in order to decrease the discomfort[2].

The medical management of the terminal illness may be complicated by co-existing psychosocial and spiritual concerns. Upon her admission to the Palliative Care Unit, Mrs. R.G. became very anxious concerning the prospect of her imminent death. Her husband had died of renal cancer five weeks previously; while coping with this grief, she had to contend with her own decline. She previously had been very independent and disliked the loss of control that she was experiencing in a hospital setting. As a result, she continually questioned the physician about many technical details of her illness and treatment. Supportive psychotherapy was very useful in assisting Mrs. R.G. in coping with her situation.

The social aspects of a terminally ill patient must be assessed continuously. Social workers arrange family meetings where questions regarding pain control, comfort level and prognosis are addressed. For example, Mrs. R.G.'s family needed reassurance that chemotherapy would no longer offer significant benefit. In addition, family members in need of bereavement support can be identified by this process.

A recreation program on a palliative care unit helps patients maintain a positive outlook and alleviate boredom. Outside barbecues, swimming and exercise programs are ideal for ambulatory patients. A bed-ridden patient, such as Mrs. R.G., may borrow a cassette recorder from the recreationist, in addition to watching television. Physiotherapy and occupational therapy contribute to patient safety and comfort by providing ambulation aids, other assistive devices and alternative modalities of pain control (transcutaneous nerve stimulation, hot packs, massage)[2].

Spiritual needs of the terminally ill can be dealt with by clergy who regularly visit with patients when requested. The rabbi on staff at Baycrest visited with Mrs. R.G. frequently and was also able to comfort her son and daughter, who had recently lost their father.

The palliative care unit provides one with an opportunity to learn about both the physical aspects of disease as well as its psychosocial implications for the patient and family. The doctor-patient relationship and the relationship between the patient and health care team are accentuated[3]. On the palliative care unit, both the patient's and family's needs take first priority. The physician must set aside time to answer questions from anxious patients or family members. The nursing staff provide a crucial link between patients and the remainder of the health care team.

In the acute care setting, death often occurs quickly or unexpectedly and the family's grief may be difficult to manage. In contrast, during a patient's stay in palliative care, the family can experience anticipatory grief. Ideally, through the process of dying, both the patient and family progress from initial denial to final acceptance. Prior to acceptance of her deteriorating condition, Mrs. R.G. and her family insisted on a continued regimen of chemotherapy in order to maintain a last glimmer of hope. Unlike general hospital wards, the emphasis in the palliative care unit is on a peaceful, comfortable death, not a cure. Aggressive treatments such as CPR and intubation are not done[1]. The patient and the family is consulted with respect to therapeutic decisions such as the use of antibiotics and I.V. fluids.

The philosophy of palliative care is the belief that care should be centred around relieving pain and suffering as opposed to aggressive treatment of the primary disease when cure is no longer possible[1,2]. The multidisciplinary approach necessitates cooperation and is very worthwhile since it facilitates treatment of all aspects of the patient's needs. The time spent on a palliative care floor allows medical students to gain an appreciation for the patient-centred approach to medicine.

ACKNOWLEDGEMENTS

We would like to thank Dr. A. Birt and the Palliative Care nursing team at Baycrest Hospital for their guidance.

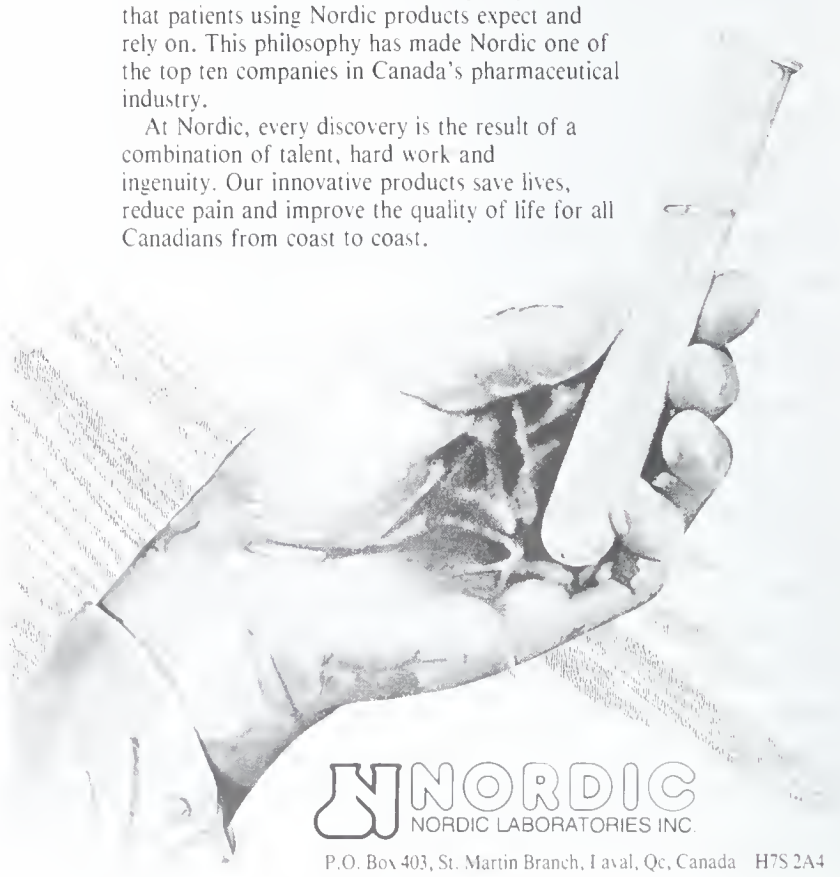
REFERENCES

1 Gordon M, Rochon P. Palliative care in geriatric long-term care facilities. Medicine 1989; 1:80-87.
2 Gutman E. Issues in palliative care of the elderly. 24th Annual Convention of American College of Health Care Administrators. Sheraton Centre, Toronto. May 1990.
3 Scanlon C. Creating a vision of hope: the challenge of palliative care. Oncology Nursing Forum 1989; 16:491-494.

HANDLED WITH CARE

Innovation is a way of life for the researchers at Nordic Laboratories. They know that inventive research and development are born from care, the same kind of quality care that patients using Nordic products expect and rely on. This philosophy has made Nordic one of the top ten companies in Canada's pharmaceutical industry.

At Nordic, every discovery is the result of a combination of talent, hard work and ingenuity. Our innovative products save lives, reduce pain and improve the quality of life for all Canadians from coast to coast.



NORDIC
NORDIC LABORATORIES INC.
P.O. Box 403, St. Martin Branch, Laval, Qc, Canada H7S 2A4

"What's the Noonwalk?"
"It's the in way to step out."

PARTICIPACTION®

Do the Noonwalk! Step out for a snack,
step out for a breath of air.
And take a bite out of a long day.

Make your move.

Common Foot and Ankle Injuries in Athletes

*Chris Giorshev, 9T1 and Perry J. Rush, M.D. C.M., F.R.C.P.(C)**

**Assistant Professor of Medicine, University of Toronto; Staff Physician, Mount Sinai Hospital, Toronto, Ontario.*

ABSTRACT

Ankle injuries commonly occur from athletic activities. Four of the most common injuries - Achilles tendonitis, metatarsal stress fractures, ankle sprains and plantar fasciitis - are described. In each, typical history and physical examinations are described, as well as management plans in order to effectively diagnose and treat the disorders.

ABSTRAIT

Fréquemment, les blessures des chevilles surviennent des activités sportives. Quatre des plus communes blessures - ténosite d'Achille, fractures de contrainte des métatarses (c'est-à-dire pied forcé), entorses des chevilles et fasciite plantaire - sont décrits. Pour chaque, on présente les antécédents typiques et l'examen physique ainsi que les traitements d'entretien afin de diagnostiquer et de traiter ces conditions éfficacement.

Foot and ankle injuries commonly result from athletic activities. Damage can occur to muscle, tendon or bone. Four of the most common injuries are Achilles tendonitis, metatarsal stress fractures, ankle sprains and plantar fasciitis. Understanding the presentation, treatment and prevention of common injuries is essential for the proper management of athletes who wish to return to competition as quickly as possible.

Achilles Tendonitis

Achilles tendonitis describes injury to the Achilles tendon, most commonly 2-5 cm above the tendon insertion. This corresponds to the area of the tendon with the least blood supply, proximal to a spiral twist configuration of the tendon just before insertion into the bone[1]. Biomechanical alignment is important in tendon health and the following abnormalities predispose to Achilles tendon injury: pronation tendency, heel valgus, forefront varus deformities, tight gastrocnemius-soleus muscles and rigid cavus foot[2].

Achilles Tendinitis most commonly affects runners, especially after a change in training pattern such as an increase in distance or an increase in the amount of hill running. Patients complain of pain in a variety of patterns. For some, the worst pain occurs when they wake in the morning or at the beginning of a run. Others experience pain

SEE YOUR CAREER IN A

which worsens with activity and is relieved with rest. Severe tendinitis is associated with constant pain, inhibiting any running whatsoever. On examination point tenderness is elicited 2-5 cm proximal to the insertion of the tendon. There may be reproduction of the pain with dorsiflexion and plantarflexion. Swelling, warmth and erythema may be observed and crepitus is occasionally found by palpation or auscultation.

Initial management of acute inflammation is conservative and can be remembered with the mnemonic 'RICE': rest, ice, compression, elevation and anti-inflammatory medication[3]. The activity that caused the inflammation should be reduced to within the limits of pain or completely eliminated if pain occurs with minimal exertion. If athletics must be continued, then ice should be applied immediately after the activity. Taping should be considered and the limb should be elevated above the heart whenever convenient. Long term treatment includes orthotics, to correct biomechanical abnormalities, and strengthening of the anterior and posterior tibial and peroneal muscles to prevent excessive pronation. A Heel-raise of 1-2 cm decreases stretching and tension on the tendon. Steroid injections into a damaged tendon are to be avoided because they can cause tendon rupture.

The best treatment for Achilles tendonitis is prevention by stretching and strengthening of the tendon and surrounding muscles[4]. The muscles can be strengthened through a daily routine of toe-raises off a step, gradually increasing the number of repetitions (figure 1). The calf muscles should be stretched daily. The gastrocnemius muscle will be stretched with the knee straight (figure 2) and the soleus muscle with the knee bent (figure 3). The patient should be reminded that stretching should not be done in a jerky motion but slowly, holding the stretch for at least 20 seconds. Maintaining a rigid training schedule that does not overextend the athlete is important in preventing Achilles tendon injuries.

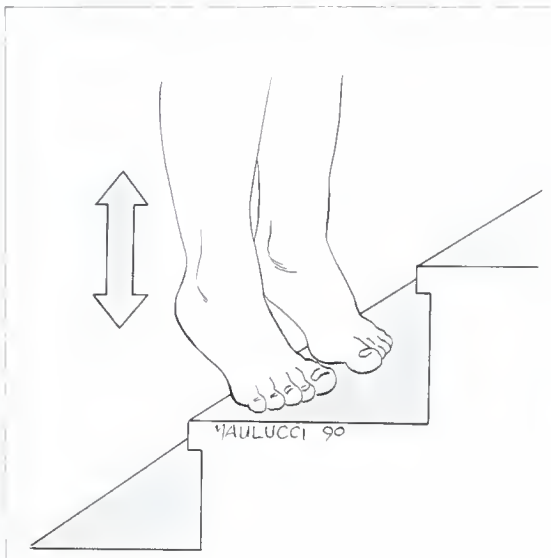


Figure 1: Illustration describing toe-raises for a muscle and tendon strengthening.

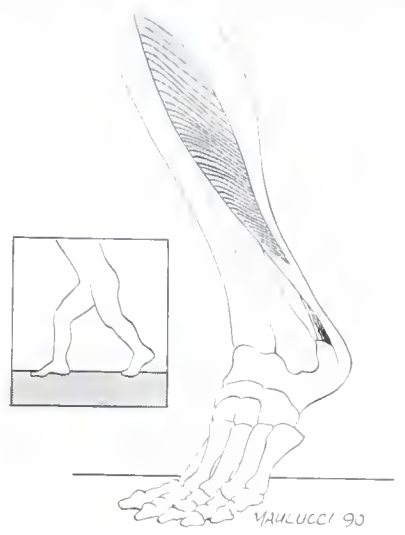


Figure 2: Illustration describing how stretching of the gastrocnemius muscles is accomplished with the knee straight.

Get the facts about the challenge and opportunity of the Canadian Forces Medical Officer Training Plan. Your new career could include a peacekeeping tour. Here's how it works.

As a student of medicine — male or female — under the Medical Officer Training Plan, you may have your medical studies subsidized for up to three years at medical school. And a maximum of two years internship training. You will attend a Canadian civilian university, your textbooks and necessary equipment will be supplied and you will be paid while you learn.

Following graduation, you will combine your medical training with that of an officer in the Canadian Forces.

For more information visit your nearest recruiting centre or call collect — we're in the Yellow Pages (TM) under Recruiting

Choose a Career, Live the Adventure.

CANADIAN FORCES
ARMED ARMÉES
FORCES CANADIENNES
Regular and Reserve Régulière et de réserve

Canada

Figure 3: Illustration describing stretching of the soleus muscle is accomplished with the knee bent.

Figure 4: Illustration describing anterior drawer test of the ankle: one hand stabilizes the lower leg while the other pulls the heel anteriorly.

Figure 5: Illustration describing towel curls with the toes.

Metatarsal Stress Fractures

Metatarsal stress fractures are hairline fractures of the second, third or fourth metatarsals[5]. The forefoot absorbs most of the force during running and, not surprisingly, these fractures are seen in sports that involve prolonged use of the feet such as soccer, basketball, and distance running. Patients with this condition complain of pain in the forefoot that is relieved by rest but recurs with weight bearing or exertion. The patient does not usually recall a specific initiating trauma although a change in the normal exercise routine over the past few weeks is often noted. As the injury worsens, the pain begins earlier into the activity, reaches a greater intensity, and takes longer to subside after the activity is discontinued.

Physical examination reveals pain and swelling localized over the affected metatarsal and pain upon flexion or extension on the toes. Initial X-rays are often negative for the first 2-3 weeks because periosteal new bone formation cannot be seen until that time. A bone scan can be positive as early as three days following the injury. Ultrasound and thermography may aid in the diagnosis. However their usefulness has been limited to screening[6].

In treating a stress fracture the patient should refrain from the activity that caused the fracture[7]. This will allow time for bone to repair. Swelling can be decreased with the use of ice, elevation of the foot and anti-inflammatory medication. In order to maintain muscular strength and cardiovascular fitness exercise should continue, however in an altered fashion. Swimming or bicycling are good choices because there is no weight bearing and thus no significant stress on the metatarsals. Some athletes may be able to participate in sports with special shoe modifications such as metatarsal pads, firm-soled shoes, supportive taping and other orthotics. The return to athletics should occur only when the activity can take place pain free, usually after 3-8 weeks. Training should then begin slowly and maximum intensity should not be reached until it can be done pain free.

Metatarsal stress fractures are 'preventable'. Stress injuries are usually encountered a few weeks after the onset of new vigorous physical activity. A well planned program should increase training slowly and progressively. Above all, training should occur in a cyclic nature, allowing the athlete to rest after 2-3 weeks of strenuous activity[8].

Ankle Sprains

Ankle sprains are one of the most commonly encountered athletic injuries. It has been estimated that a significant ankle sprain occurs with an incidence of one per day in a population of 10 000[9]. A sprain is defined as a tear in some or all of the fibres of a ligament. They can be classified as grade I, with less than 25 percent of fibres torn, grade II, with 25 to 75 percent of fibres torn, and grade III, with greater than 75 percent of fibres torn. Eighty-five percent of all ankle sprain occur to the lateral collateral ligament during plantar inversion[10]. In 85 percent of those cases the anterior talofibular ligament is sprained[11] representing 72 percent of all cases. With greater plantar flexion and eversion the calcaneofibular ligament will be stressed and possibly damaged. This combined injury represents approximately 20 percent of ankle sprains[12]. Tearing of the deltoid ligament occurs much less frequently than that of the lateral ligaments, but when they occur they are usually much more debilitating.

Typically a patient describes the foot turning inward or outward with the full weight bearing down on it, resulting in an intense localized pain[13]. There is often an audible 'pop' heard or a tearing sensation felt. Examination of the ankle may reveal localized swelling, ecchymosis and tenderness over the affected ligaments. Several tests may be used to determine the stability of the joint including stress tests, stress x-rays, and arthrography. A stress test commonly used is the anterior drawer test. With the athlete sitting in a flexed knee position one hand stabilizes the lower leg while the other pulls the heel anteriorly (figure 4). Excessive movement is consistent with a rupture of the anterior talofibular ligament and, if grossly positive, the calcaneofibular ligament as well. A positive talar tilt test describes an inversion of the talus of greater than 20 degrees and is consistent with complete tears of the anterior talofibular and calcaneofibular ligaments. Stress x-rays can be used if a stress test was positive and should be done on both sides for comparison. Treatment of a first-degree sprain is supportive. The RICE regimen should be implemented for the first few days and then as needed during recovery. Second-degree sprains require the same regimen but for longer periods of time. The use of a posterior splint or taping should be applied to the ankle in a 90 degree position. After a few weeks weight bearing, range of movement and passive resistive exercises should be tried. Return to athletics should be gradual and adhesive taping should be used during training until there is full range of motion and strength.

The treatment of third-degree sprains can be conservative or surgical[14]. Conservative treatment includes casting for four to six weeks with an additional six weeks of ankle protection (crutches or taping). Rehabilitative measures should be taken until full range of motion and strength are achieved. Surgical consultation is recommended for tears of both the anterior talofibular and the calcaneofibular ligaments, especially in athletes anxious to return to competition. Rehabilitation is geared toward returning the patient to normal activity as quickly as possible, by strengthening the leg and foot muscles. The peroneal muscles prevent inversion and strengthening these muscles may prevent recurrent injuries. Specific ankle exercises include foot circles, writing the alphabet with the toes, and tugging a towel with the toes. It is particularly important during the rehabilitative phase that other activities are maintained in order to maintain general conditioning.

Plantar Fasciitis

Plantar fasciitis describes inflammation of the plantar fascia, a fibrous band extending on the plantar surface of the foot from the calcaneus to the heads of the metatarsals[15]. The main role of the fascia is to support the arch of the foot. Problems can arise if the fascia is pulled away from the calcaneus causing microscopic tears in the fascia. Predisposing factors are flat pronated feet, high arched feet, increasing age, increasing weight or the use of inappropriate shoes during running. Acutely, inflammation is usually localized to the origin of the fascia at the calcaneus. If the condition becomes chronic the pain can extend through the entire length of the fascia possibly causing it to become thicker. As the periosteum becomes raised at the calcaneus, bone is deposited within the space forming a bone spur. It should be noted that bone spurs have been found in asymptomatic patients and do not cause any pain by themselves.

Patients with inflammation of the plantar fascia complain of pain under the calcaneum that is usually worse at the beginning of the day as they step out of bed and at the end of the day after prolonged walking. Athletes may complain of pain when they carry a weight or when pushing off at the beginning of a run. Examination may reveal swelling and pain near the calcaneal tuberosity and it may radiate throughout the foot in more severe cases. X-rays may reveal bone spurs, and bone scans may be hot at the insertion of the fascia into the calcaneus[16].

The initial treatment of plantar fasciitis includes reducing the normal athletic routine to within the limits of pain and pursuing other activities, such as swimming, that maintain cardiovascular fitness without aggravating the fascia. After an athletic activity ice should be applied under the heel to limit inflammation. The use of oral anti-inflammatory medications may be considered. However, cortisone injections into the area are usually more successful. Shoe modifications can relieve the pain of plantar fasciitis. A rubber or foam pad can be placed in the shoe to cushion the heel. The pad should not press directly on the sore area but around it, raising it from direct contact to the shoe. Orthotics can also be used to correct biomechanical abnormalities such as pronation. Physiotherapy should be implemented to strengthen the small muscles of the foot to support the weakened plantar fascia. A successful exercise commonly utilized is towel curls. A towel placed on the floor should be curled towards the patient using only the toes of the injured foot (figure 5). The exercise level can be increased by placing a weight on the towel. Conservative measures are rarely unsuccessful and in those cases surgery can be considered to release the plantar fascia.

Foot and ankle injuries are common in athletes but can usually be resolved quickly. With prompt recognition and management, the threat of a progressively worsening, chronic injury can be curtailed, allowing the athlete to return to competition injury free.

ACKNOWLEGEMENTS

This work was supported in part by the Canadian Arthritis Society.

REFERENCES

1. Root ML, Orien WP, Weed JH: Normal and Abnormal Function of the Foot. Los Angeles Clinical Biomechanics Corp., 1977.
2. Stanish WP, Coady C, Langly I: Foot and Ankle Injuries in Athletes. Med North A. 66-71, 1987
3. Dupont M, Beliveau P, Theriault G: The Efficiency of Anti-inflammatory Medication in the Acutely Sprained Ankle. Am. J. Sports Med. 15:41-45,1987
4. O'Neill DB, Micheli LJ. Overuse Injuries in the Young Athlete. Clinics in Sports Medicine 7(3):591-610, 1988
5. Markay KL: Stress Fractures. Clinics in Sports Medicine 6(2):405-425, 1987
6. Nitz AJ, Scoville CR: The use of ultrasoud in the early detection of stress fractures of the medial tibial plateau. Milit Med 145:844-846,1980
7. McBryde AM. Stress Fractures in Runners, In D'Ambrosia R, Drez D (Eds.). Prevention and Treatment of Running Injuries. Slack, New Jersey. 1982
8. McBryde AM: Stress Fractures in Athletes. J.Sports Med. 3:212-217, 1975
9. Mack RP. Ankle injuries in athletes. Clin Sports Med 1:71-84, 1982
10. Leach RE, Lower G: Ankle injuries in skiing. Clin Orthop 198:127-33,1985
11. Connolly JF: Depalma's the management of fractures and dislocations; an atlas. Philadelphia:W B. Saunders Co, 1981
12. Birrer RB: Ankle injuries and the family physician. J Am BD Fam Pract 1:274-81, 1988
13. Diamond JE: Rehabilitation of Ankle Sprains. Clinics in Sports Medicine 8(4):877-891,1989
14. Leonard MH: Injuries to the Lateral Ligaments of the Ankle. J. Bone Joint Surg.(Am.) 31:373-377,1949
15. Torg JS, Pavlov H, Torg E: Overuse Injuries in Sport: The Foot. Clinics in Sports Medicine 6(2):291-320,1987
16. Przylucki H, Jones CL: Entrapement Neuropathy of Muscle Branch of the Lateral Plantar Nerve; A Cause of Heel Pain. J. Am. Pediatr. Assoc. 71:119-124,198, 1981

INTERNATIONAL HEALTH PROGRAMME
University of Toronto Medical Society

Founded in 1989, the IHP is a charitable, student-run programme designed to increase the awareness and concerns that is put on health care by alternative cultures and socioeconomic nations. Our programme facilitates the organization of electives in developing nations, and increases the profile of international health through intra- and extra-curricular lectures.

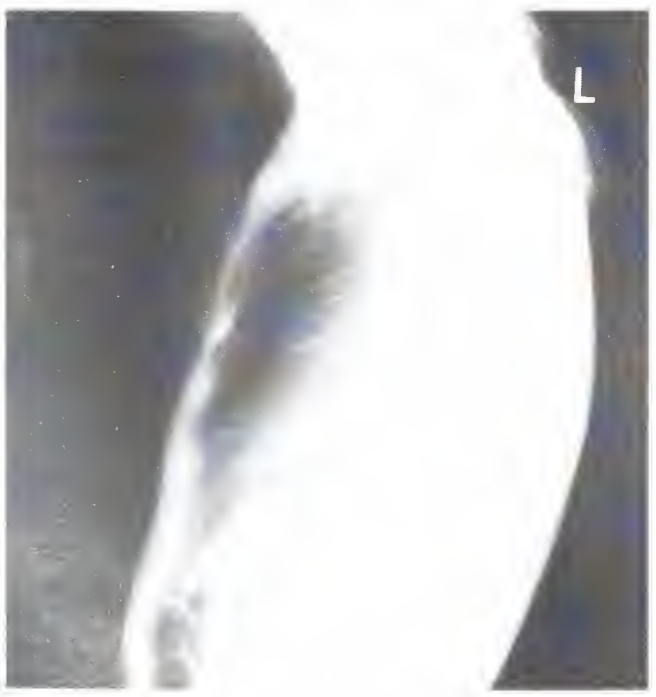
If you would like more information, or would consider assisting our programme through provision of sponsorship or further foreign-elective contacts, please write to:

IHP Co-ordinators
Medical Society
Room 2141, Medical Sciences Bldg.
1 King's College Circle
M5S 1A8

RESPIROLOGY

ALAN BAROLET, 9T2

Case 1: Mr. A.M., a 64 year old man with a 35 pack-year smoking history, presented with hemoptysis and chest pain.



Answer Case 1

The right hemithorax is opaque and the heart and mediastinum shifted to the right. He has developed atelectasis secondary to obstruction of the right main bronchus by a squamous cell carcinoma. Note contrast material in left lower lobe.

Case 2: Mrs. E.K., a 25 year old woman, who required a chest film for insurance purposes. Physical exam was normal.

Answer Case 2

There is marked bilateral hilar lymphadenopathy. A classic presentation of asymptomatic pulmonary sarcoidosis.

Case 3: Mrs. H.C., a 68 year old woman with a 20 pack-year smoking history, who presented complaining of chest pain.

Answer Case 3

The trachea is deviated slightly to the right. Inspection of the mediastinum reveals a hiatus hernia as the cause of her pain. Note that she had previously had a mastectomy of the right breast.

Case 4: Mr. P.D., a 63 year old man, presented with a 6 month history of hemoptysis. He was treated for tuberculosis 37 years ago.

Answer Case 4

There is bilateral fibrosis with multiple tuberculous cavities in the upper lobes. Careful inspection of the right upper lung field reveals a large aspergilloma below the clavicle.

ACKNOWLEDGEMENTS

The cases were provided by Dr. Victor Hoffstein, St. Michael's Hospital.

A Clerkship Elective in Northwestern Ontario

Jonathan Marcus, 9T1

As I was landing in Thunder Bay's airport at 5 P.M. on August 27, 1990, I was initially overcome by a feeling of isolation. I had flown to the hub of Northwestern Ontario and all around me I could see rolling wooded hills and rocky cliffs. There was a mist in the valleys and a light rain was spitting from the sky. It had occurred to me that this was the furthest north or west that I had ever been. All the brochures I could have read on the region could not have prepared me for how I felt at that instant.

The airport was the smallest I had ever seen and I was soon whisked off in a taxi to the bus terminal. My final destination would be Nipigon Ontario, a town of approximately 2000 people about 70 miles northeast of Thunder Bay on the Trans-Canada highway.

The bus dropped me off on the edge of town and I had a short walk to the Nipigon District Memorial Hospital where I would be based during my stay. As I walked into the hospital at 8 PM the first few people I spoke to had no idea that a medical student was coming. Eventually I was led to one of the resident's on-call rooms on the second floor of the building where I would be rooming. All my travel expenses and accommodations were funded by Northwestern Ontario Medical Program. I had to cover my food expenses but the subsidized rates for staff kept the bill less than $40 per week.

The hospital was built in the late 1940's by the Red Cross. It looked like a very large home with two newer wings which were added as they became necessary. It serves a population of approximately 4000 which includes Nipigon, the nearby town of Red Rock, surrounding smaller towns, and Indian reserves. There were approximately 35 beds most of which were used for chronic care. The emergency room was small and was used by the population mainly for non-emergency care which was not immediately available from their family doctors. The hospital was equipped with a laboratory which could perform routine bloodwork and urinalysis. The X-ray department was equipped to perform plain films and ultrasound but the hospital had been unable to find an ultrasound technician. There was also a physiotherapy department but it closed down shortly before I left as the team decided to move west. Currently a new, more modern facility, is being planned to replace the existing hospital building and construction is scheduled to begin next year.

There are four family practitioners and no specialists practising in the region. Three physicians run a practice out of the hospital building. While the fourth practice was conducted out of the doctor's home in Red Rock, the physicians share responsibility for the emergency department and the inpatient ward. Referrals are made to hospitals in Thunder Bay.

My schedule was very simple. I spent one day each week with each physician. Part of each day was spent in the emergency room and the rest was utilized in the physicians' offices. My responsibilities were similar to those of a clinical clerk on a family practice rotation in Toronto. I would formulate diagnoses and plan therapeutics. On Wednesday's one of the doctors and I travelled north 60 miles to the town of Beardmore. In this town of 500 we conducted a day clinic. Together we saw approximately thirty to fifty patients during an eight hour day. I took no night call to emergency but was awakened for life-threatening cases. On one occasion I had the opportunity to assist in the diagnosis and management of an acute myocardial infarction.

Towards the end of my stay I had the opportunity to visit a native reserve. I was disappointed to see it in such a state of disrepair. The homes had unfinished wooden floors. Lights hung out of ceilings without fixtures and sheets were used as doors. Kitchens were unsanitary and old car parts littered the lawns. Alcoholism was rampant. Many of the natives that I talked with expressed feelings of discontent with their living conditions. Although the Federal Government pays all building costs on the reserves including housing, the natives feel that the Federal Government should increase funding. The rest of North American society has tempted them with a variety of consumer goods and changes in lifestyle. Unfortunately, their culture and living habits have made it difficult for them to support their addiction to our temptations. I respect their desire to maintain their culture, however, considering their lifestyle aspirations, I feel that this will be incompatible with an ability to maintain self sufficiency. To make matters worse, 'successful' or educated natives rarely return to the reserves. My overall conclusions were that the Indians on the reserves have multiple social and financial problems. The Federal Government will play a role in resolving difficulties but the ultimate responsibility must rest upon native society.

The Nipigon/Redrock region is essentially a one industry town. If one does not own a business or practice a profession, then they most definitely work for the pulp and paper industry. The unions are very strong and as a result, workers earn between $30-60,000 per year. Most of the residents own both a house and a cottage.

While in Nipigon, I had limited opportunity to experience recreational and cultural activities. I was the only medical student and I did not have a vehicle. Although most of the people were very friendly, they maintained a relatively detached relationship with outsiders. A significant amount of hinting, almost to the point of begging, led to a productive fishing trip. I also managed to hitchhike to the golf course and back. Hunting, bowling and curling were also popular activities but I did not take part in these. The other cultural experiences Nipigon has to offer include fighting and drinking. I passed on the fighting.

I was somewhat disappointed with some of the social aspects of my stay but other clinical clerks who visited larger towns or who shared the experience with other students had no complaints in this area. All things considered, I am glad that I made this trip to the north. The medical and other hospital staff welcomed me into the local health care system. This elective provided an excellent opportunity to experience medical and nonmedical aspects of practising medicine in Northwestern Ontario.

BOLIVIA: MORE THAN JUST THE LAND OF COCAINE

Mark S. Moores B.Sc., 9T2

On June 5th, 1990, I left Toronto to start an eleven week adventure in the low-lands of Bolivia. Although I knew where I was going, I had no clue what I was in for. I was hoping that having grown up in Venezuela and my knowledge of the Spanish language would help me. I arrived in Cochabamba to quite a welcoming party. Several of the local Baptist missionaries were there to meet me, along with department heads of the local branch of the 'junta' or Board of Health. This was a first for both them and me. They had never had a medical student come down before as a Baptist volunteer. We sat down together that day to discuss my project and exactly what I would be doing. After my orientation , I left for Villa Tunari, a little town in the Chapare lowlands. It was only 176 km away but due to the roads and many police checkpoints, (checking for cocaine) the trip took approximately four hours. During those four hours we dropped 8000 feet in altitude. As we drove along the edge of the mountains the scenery was awe-inspiring.

On arrival at the clinic, I was taken to the 'Quirofano' or surgical suite. A young boy had been brought to the clinic just before we arrived with a gunshot wound in the leg. It had occurred completely by accident when he tripped an armadillo trap. We gave him a short acting barbiturate to ease his pain, so we were able to have a better look at his wound. It soon became obvious that all we could do for him was clean the wound well, give him some prophylactic antibiotics and send him to one of the major hospitals in Cochabamba. Without any form of radiology we would have never found all the pellets that were in his leg. This made for quite a first day at the clinic. That night after things settled down, I began to realize the nature of my situation. The clinic had no electricity, except from 6:30 to 9:30 each night when the generator was turned on, and no one spoke English.

The Bethesda Clinic was founded in 1965 by Rev. John and Dr. Margarite Cserepka through the Bolivian Baptist Union. They saw a need for a clinic to deal with the problem of snake bites. That need is still being met, along with many others. Due to economic reasons, the clinic is now operated by one doctor and one nurse and the number of patients is reduced from 400 to 90-100 per month.

Although there were fewer patients than previous years, this did not prevent us from seeing many interesting cases. The variety was almost endless. Common things were still common and we treated many cases of acute respiratory tract infection, asthma, menstrual irregularities, gastroenteritis, malnutrition and trauma. We also saw some rarer cases such as snake bites, intestinal parasites and chronic anaemia as a result of these worms, rheumatic fever, pulmonary and extra-pulmonary tuberculosis, rabies, an incomplete spontaneous abortion and coma due to self poisoning. Of course many of the things we consider common here are rare in Bolivia and vice-versa.

I would like to share a few cases which stick out in my memory. Delivering babies was not one of the things I thought I would be doing when I left, but I am thrilled to have had the opportunity. It was a real pleasure to have aided the entry of a new life into this world. One woman was only six months pregnant when she went into labour. There was nothing we could do for her except deliver her child. We were elated when the little girl began to cry in Dr. Pedroso's arms. The little girl weighed only slightly over a kilogram and she lived!

Not all stories ended so happily. One man arrived in a coma and died. He had ingested an insecticide. Another man, with diabetes, presented in seizures. Without the facilities of a lab to establish what electrolyte disturbances were going on and what his blood sugar was, we were literally shooting in the dark trying to treat him. No matter what we did, he continued to seize and eventually died. We also had a little six year old boy who presented with a snake bite. At first his prognosis looked grim, as over ten hours had elapsed since his bite and for six of those hours he had three tourniquets on without release. His condition quickly stabilized after we rehydrated him, gave two ampoules of polyvalent antivenom and several ampules of clotting factors. The greatest risk of death early on was from haemorrhage. This venom is a very powerful anticoagulant and this is why victims can bleed from every mucus membrane, and even cry blood.

It just happened that the next day was the 'change of shifts' (when Dr. Pedroso leaves for his monthly five-day vacation and Dr. Crespo comes to cover). The problems began when Dr. Crespo did not arrive and Dr. Pedroso had already left. This on its own wasn't too bad for the little boy who was still stable, but this suddenly changed. At approximately 1:15 am he went into respiratory distress and within five minutes he stopped breathing. At this point all efforts were futile, and shortly after artificial respiration was started , he died. It was felt afterwards that he died from

a combination of events and ultimately due to multiple pulmonary emboli from his leg. We had been in a no-win situation, for if we did not give him the clotting factors he would have continued to bleed, but by giving them, we promoted clot formation in his leg. There was nothing that I could have done, but that didn't help the feelings of inadequacy. The case of this little boy has left an indelible mark on my life.

There were many other experiences during my trip that made it such a success. During a Baptist retreat, the clinic was asked to give a series of talks on primary health care. I was approached to do the talk on Acute Respiratory Tract Infections (Infeccions Respiratorias Agudas). I also attended the fifth Latin American Medical Students Congress. The research papers presented were impressive, diverse, and especially interesting to me as they discussed many conditions not found in Canada.

The most touching part of my entire trip was the way I was accepted and welcomed by the people there. I was asked to be a part of the celebrations and the tragedies. Most of all, I was welcomed into their church with open arms.

I learned a great deal this summer—how a doctor can function with only a clinical history and a physical exam. But only a small portion of my learning experience was clinical. The people and how they viewed life was a lesson all in itself. They are people-centred, not agenda-centred. But most of all, it was an inspiration to see Christ working so hard among these people, for in His eyes we are all truly equal.

Essays In Biomedical Ethics

Prizes totalling $500.00 will be available for the best essay(s) on biomedical ethics submitted by undergraduate medical students. The topics may include clinical ethics, issues in physician education, personal ethical experience involving patients or health care professionals, issues of health policy and resource allocation or others. The essay should address the following questions: Is there a stated point to the essay? Is the point important? And, is the point addressed in an organized manner and supported by critical argument?

Dr. Eric Meslin, Biomedical Ethicist, 480-4818, and Dr. Neil Lazar, Physician, 340-3438, will be available to provide advice on topics and reference materials. Essays should be submitted to Dr. John Senn, Clinical Ethics Centre, Sunnybrook Health Sciences Centre, 2075 Bayview Ave., Toronto, M4N 3M5 by March 15, 1991. Provided the essays are of sufficient quality, decision as to the winning submission will be made by May 30, 1991. The winning essay(s) will be published in the University of Toronto Medical Journal.

Membership in the OMA:

THE STUDENT PERSPECTIVE...

More than 80 per cent of Ontario's practising physicians are OMA members.

Membership strengthens our voice on health care in the province. As a medical student, you are the voice of the future. By joining the OMA, you can contribute to decisions influencing the direction of health care in Ontario, and in turn influence the way you will one day practise medicine.

HEALTH POLICY INITIATIVES

Much of the OMA's work is performed by clinical committees and sections. These bodies address a variety of issues to help physicians provide quality health care and respond to new challenges facing modern medicine. The Committee on Student Affairs and the Section of Medical Students enable medical students to contribute their unique perspective on health care and to keep abreast of the latest developments in organized medicine.

STUDENT MEMBERSHIP FEE

To learn more about the OMA's special fee categories for students, contact:

Ontario Medical Association
250 Bloor Street East
Suite 600
Toronto, Ontario
M4W 3P8
(416) 963-9383
1-800-268-7215

"To serve the Medical profession and the people of Ontario in the pursuit of good health and excellence in health care."

A TRANSGENIC APPROACH TO THE GENETICS OF DEVELOPMENT AND DISEASE

Paul Ellis, M.Sc., 9T2

On May 3, 1990, Mr. Timothy Meakin, President of Bristol-Myers Squibb Pharmaceuticals in Canada, awarded the largest research grant in Canada to Dr. Alan Bernstein, Associate Director of the Samuel Lunenfeld Research Institute of Mount Sinai Hospital. The award consists of a total of $5.75 million in support of basic science for five years. Dr. Bernstein's successful program, "The Genetics of Development and Disease: A Transgenic Approach", was selected in a competition of 75 submissions from Canadian institutions. This latest and most significant research award for basic science has been spurred on by Bill C-22, passed by the Parliament of Canada in 1987. Attending the announcement were the Honourable Pierre Blais, Federal Minister of Consumer and Corporate Affairs and Mr. Monte Kwinter, former Ontario Minister of Industry, Trade and Technology.

The goal of the Mount Sinai research, funded by Bristol-Myers Squibb Canada, is to define the genetic program that controls the development of an embryo and to develop mouse models of a variety of human diseases. The principle investigators, Drs. Alan Bernstein, Martin Breitman, Alexandra Joyner, Tony Pawson and Janet Rossant, will pursue four different approaches employing technology to generate mice which have specific changes or mutations introduced into their genetic make-up. These "transgenic mice" will have heritable germline mutations which will permit the identification and detailed analysis of the function of these genes throughout the life of the animal.

The first approach involves the micro-injection of cloned oncogenes (the genes associated with the development of cancer and the regulation of growth) into fertilized mouse eggs. The investigators are interested in the transgenic mice which express abnormally high levels of a particular oncogene, *v-fps*. The over expression of the *v-fps* oncogene has been associated with the development of an enlarged heart and neurological abnormalities.

The second project involves a technique developed by Drs. Bernstein and Breitman called genetic ablation. Genetic ablation involves the micro-injection of toxin genes linked to tissue-specific promoters into fertilized eggs. As the organism grows and the targeted tissue begins to develop, the genes coding for the toxin will be expressed and the targeted tissue destroyed. This technique will be used to study the role of specific cell types in the regulation of orderly development and function of the immune system and of the central nervous system.

The embryonic stem cells, totipotent cells capable of giving rise to all of the specialized cells which make up the adult animal, will be used to study the genes implicated in embryogenesis, the regulation of the blood forming system and function of the nervous system. Whereas the two former projects are designed to look at dominant mutations, this latter project will be concerned with the investigation of recessive mutations.

As a result of the random incorporation of exogenous DNA during the creation of transgenic mice, pre-existing genes in the germline may be disrupted. The development of mice which show patterns of diseases similar to syndromes in man will be used to identify the disrupted gene(s). These genes can then be further characterized.

GENE THERAPY: IS IT ALMOST HERE?

Paul Ellis, M.Sc., 9T2

Children born with adenosine deaminase deficiency (ADA) deficiency do not have a functioning immune system. This syndrome is commonly referred to as the "bubble-boy disease". Currently, there are two treatments for children with ADA deficiency. One involves a bone marrow transplant which supplies the progenitor cells containing the ADA-gene while the other involves replacing the deficient enzyme with a drug called PEG-ADA. Dr. W. French Anderson and his colleagues at the National Institutes of Health (NIH) will be pioneering a new therapy this fall for those patients who cannot undergo a bone marrow transplant. The peripheral lymphocytes collected from affected individuals will be injected with the ADA-gene which will then be infused back into the patients. This autologous graft, if successful, will eliminate the need for bone marrow transplants and PEG-ADA in children with ADA deficiency.

Dr. Anderson's therapy is based on work done with melanoma patients, published recently in the New England Journal of Medicine 1990:323;570-578. Approximately half of the patients treated with tumour infiltrating lymphocytes (TIL) and interleukin-2 (IL-2) showed regression of their metastatic melanoma. The TIL's were labelled, using retroviral-mediated gene transduction to introduce the gene coding for resistance to neomycin, prior to infusing them into patients. The neomycin resistance gene was used as a marker to define the in vivo distribution and survival of the TIL's. The autologous TIL's were found in the metastatic tumours and were detected in the peripheral circulation for up to two months following their administration. This landmark study has also paved the way for clinical trials using TIL's transfected with the tumour necrosis factor (TNF) gene. TNF destroys the cancer cells but when given systemically causes severe weight loss. This new therapy, utilizing TIL's, will concentrate the TNF at the tumour site and hopefully eliminate it's systemic side effects.

The recently discovered cystic fibrosis (CF) gene, co-identified by Drs. Tsui of the Hospital for Sick Children and Collins of the University of Michigan, codes for a protein that transports chloride across cell membranes. Defects in this protein result in thick tenacious mucous accumulating in the respiratory and digestive tracts. Dr. Rommens, also at the Hospital for Sick Children, and Dr. Tsui, have constructed a healthy version of the CF gene, and together with Dr. Collins, have inserted it into CF cells in vitro. Dr. Frizzelland and his colleagues at the University of Alabama, have determined that the made-in-Canada gene was expressed in these cells and in fact corrected the defect (Cell 1990; 62(6);1227-1233). The next step is to try and correct the defect in vivo.

Harrison's Principles of Internal Medicine.

12th edition. J.D. Wilson, E. Braunwald, K.J. Isselbacher, R.G. Petersdorf, J.B. Martin, A.S. Fauci and R.K. Root (Eds). 2208 pages, illustrated; McGraw-Hill Inc. 1990. $115.00

The twelfth edition of Harrison's marks the 50th anniversary of the publication of the original version of this text. As owners of previous editions will know, Harrison's is nothing if not comprehensive. Within it's 2208 pages (divided into 380 chapters), it is possible to find practically everything known relating to the field of internal medicine.

Most of the students I have spoken to regarding this text have kind of a love-hate relationship with it. While every medical student **should** read it cover to cover, Harrison's Principals of Internal Medicine will probably function primarily as a reference text for most. The design and layout of the book certainly lends itself to this. Finding the information you want is easy. Even the table of contents is presented three different ways to make it simple to find a given general or specific topic. All are clearly laid out, the first according to topics, the second an abbreviated outline of the sections and chapters, and the third a detailed (12 pages) outline of the contents. The index alone is 179 pages.

The core reference material in this text is found in parts 6 through 14. The various chapters found in these sections are comprehensive discussions of everything from the pathophysiology of disease processes through to diagnosis and treatment of each disease. All chapters have been updated with new material. The 12th edition also contains new chapters, where appropriate, discussing significant advances in medicine such as the role of molecular biology and new imaging techniques in the understanding of disease processes. Included with the expanded section on genetics is a welcome description of the various molecular biological techniques. This will be of help to those uninitiated in this sometimes confusing world.

In addition to the extensive reference material on virtually any given topic, I feel that in many ways the most interesting part of this book is to be found in the first 450 pages. These are devoted to more general discussions on topics in medicine. New to the 12th edition is the "Introduction to Clinical Medicine" section, a brief discussion of the humanistic requirements for a successful career in medicine and the social realities of medicine in our society. Part one, "The Biological Basis of Disease" will be useful not only to the medical student, but also serve as a relatively concise information source to practising physicians who want to keep abreast of the latest developments in all areas of human biology.

Part two, "Cardinal manifestations of Disease" is a comprehensive introduction to clinical medicine. The chapters are grouped according to major patient symptoms, further broken down on the basis of organ systems. While long and quite detailed, these sections are nonetheless very readable. They contain a wealth of information that every medical student must become familiar with during their clinical training. Both Parts 1 and 2 have been revised and updated in the new edition.

In all, the 12th edition of Harrison's maintains the high standards set by previous editions of this preeminent text. While this book is fairly heavy going the determined medical student will be richly rewarded. If you seek details and specifics, there are few better organized more complete sources.

Bjug Borgundvaag Ph.D. 9T2

Living and Working With Schizophrenia: Information and Support for Patients and Their Families, Friends, Employers, and Teachers.

Jeffries, J.J., Plummer, E., Seeman, M.V. and Thorton, J.F. 148 pages University of Toronto Press, Toronto, Ontario, 1990; $11.95.

Although the prevalence of schizophrenia is estimated at 1%, the general population knows very little about this illness. In part the social stigma associated with mental illness has prevented an abundance of public discussion. For the family and friends of an afflicted individual this has created an awkward situation in which it is difficult to find out what is happening and what they can do to help. The above book by Jefferies et al. provides needed information and supportive advice for the patient with schizophrenia, their friends and relatives.

The book is divided into two parts. The first deals with basic information about the illness. It is written in lay terms with minimal use of medical jargon. The discussion begins with a description of schizophrenia: it's characteristics, proposed causes, and risk factors. It then goes on to explain the different treatment options such as medical therapeutics and the role of in-patient vs. outpatient care. The likely course of the illness (usually chronic), and the role of the family in treatment are also discussed.

The strength of this book lies in the willingness of the writers to address questions which may be overlooked by health care givers and which a family may feel uncomfortable asking. For example, the authors explain the role of the different health care workers involved in treatment ie. psychiatrist, nurse, social worker, etc, and what should be expected of each. Issues regarding patient autonomy and confidentiality are also explored. Besides its informative value, this book also provides support for the family. It dispels the belief that the family is responsible for the patient's illness, and helps the family set realistic future expectations.

The second part of the book is made up of autobiographical accounts, sharing the illness from the perspective of the patient, family and the physician. They detail their experience and give advice based on personal insight.

For those who know someone with schizophrenia this book is a useful reference. It answers many questions, and suggests an approach for dealing with this illness. For the health care worker, it may be enlightening to look at events from the perspective of patient and family, focusing on many psychosocial aspects of this illness.

Adam Blackman 9T2

MEDICINE, LITERATURE AND EPONYMS

An Encyclopedia of Medical Eponyms Derived from Literary Characters. By Alvin E. Rodin and Jack D. Key. 345 pages. Robert E. Krieger Publishing Company. 1990 $39.95

What's in a name? True, that which we call a rose by any other name would smell as sweet, but what of morphine? It would certainly be just as effective if it were not named for the Greek god of dreams, but the fact remains that there is something in it's name per se. Similarly there is a great deal of meaning in the thousands of eponyms we use in everyday life. Pasteurized milk and 60-watt light bulbs are rarely, if ever, associated with the scientists whose names have been immortalized through these products.

Eponyms are one of the most popular linguistic devices in English and other languages. But if they are ubiquitous in common parlance, they are inescapable in the fields of medicine. There is no area or speciality of medicine that is not rife with eponymous syndromes, terms, and structures. In the majority of cases, the eponym was chosen for (or imposed by) the person who originally described the symptom complex, anatomical landmark, or treatment, as the case may be.

Unfortunately, while such eponyms contain a wealth of medical history, they often become a nightmare for the medical student trying to sort out the various conditions attributed to Dr. Harvey Cushing, of the tongue-twisting neuroanatomical landmarks including the Nucleus Z of Brodal and Pompeiano.

Another arguably more enticing category of eponyms includes those derived from literary characters, and it is these names in particular that have been painstakingly culled from the medical jargon and collected in this Encyclopedia of Eponyms.

Drawing on all categories of literature, from mythology and biblical sources to modern cartoons (to wit the radiological Mickey Mouse sign), the book comprises over 350 entries. All of these are discussed according to the same useful and readable format. First the relevant medical summary is provided, followed by a background of the literary allusion in question. The authors then briefly elucidate the tie-in between the two, and complete the entry with other associated references, be they cultural, historical, or literary. Many items are also accompanied by illustrations.

More than half of the citations are in the domain of psychiatry, with the remainder distributed throughout the other specialities. In terms of origin, mythology seems to have been most successful in infiltrating the medical literature. Eponyms borrowed from mythology range from the obvious Achilles tendon, to the sly venereal diseases, to the sublime atlas, the first cervical vertebra who supports the skull on his shoulders.

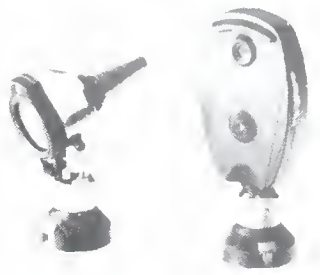
Overall, this comprehensive collection constitutes a highly innovative and well-conceived reference volume, of value to both physicians and laymen alike. As the authors point out in their introduction, the contribution of medicine to literature is well-recognized and indeed of much historical and literary importance. However, as this compilation attests, there is no denying a reciprocal and greatly enriching permeation of medicine - by literature.

Deena Ages M.D. 9T0

HEINE

SETTING NEW STANDARDS

BETA 200



OPHTHALMOSCOPE

- Aspherical Optical System
- Complete Aperature Range
- Dust Proof
- Glass Optics
- Cast Aluminum Frame

OTOSCOPE

- Fiber Optics (Armoured)
- All Steel Head
- 3X Magnification
- Scratch Resistant Glass Lens

FOR ADDITIONAL INFORMATION, CONTACT YOUR MEDICAL SUPPLIES DISTRIBUTOR OR:

HEINE INSTRUMENTS (CANADA) LIMITED

20 Steckle Place, Unit 3, Kitchener, Ont., Canada N2E 2C3
Phone (519) 895-1020 **Fax** (519) 895-1022

University of Toronto
BOOKSTORE

Medical Text & Reference

Course Texts
Board Reviews
Handbooks and Manuals

Largest selection of general interest books in medicine, nursing, dentistry, rehab., surgery, pharmacy and more.

Special Order Service
and FREE Stock List

Diagnostic Instruments
Lab Coats
Examination Gloves

214 College Street
in the Koffler Centre
Mon.-Fri. 9am - 6pm, Sat 10am - 5pm
978-7911, 7913 FAX 978-7242

Benefit Performance

U of T Medical Journal presents

a unique opportunity to experience
the musical art of South India

Dance performance by Ms. Meera Krishnan

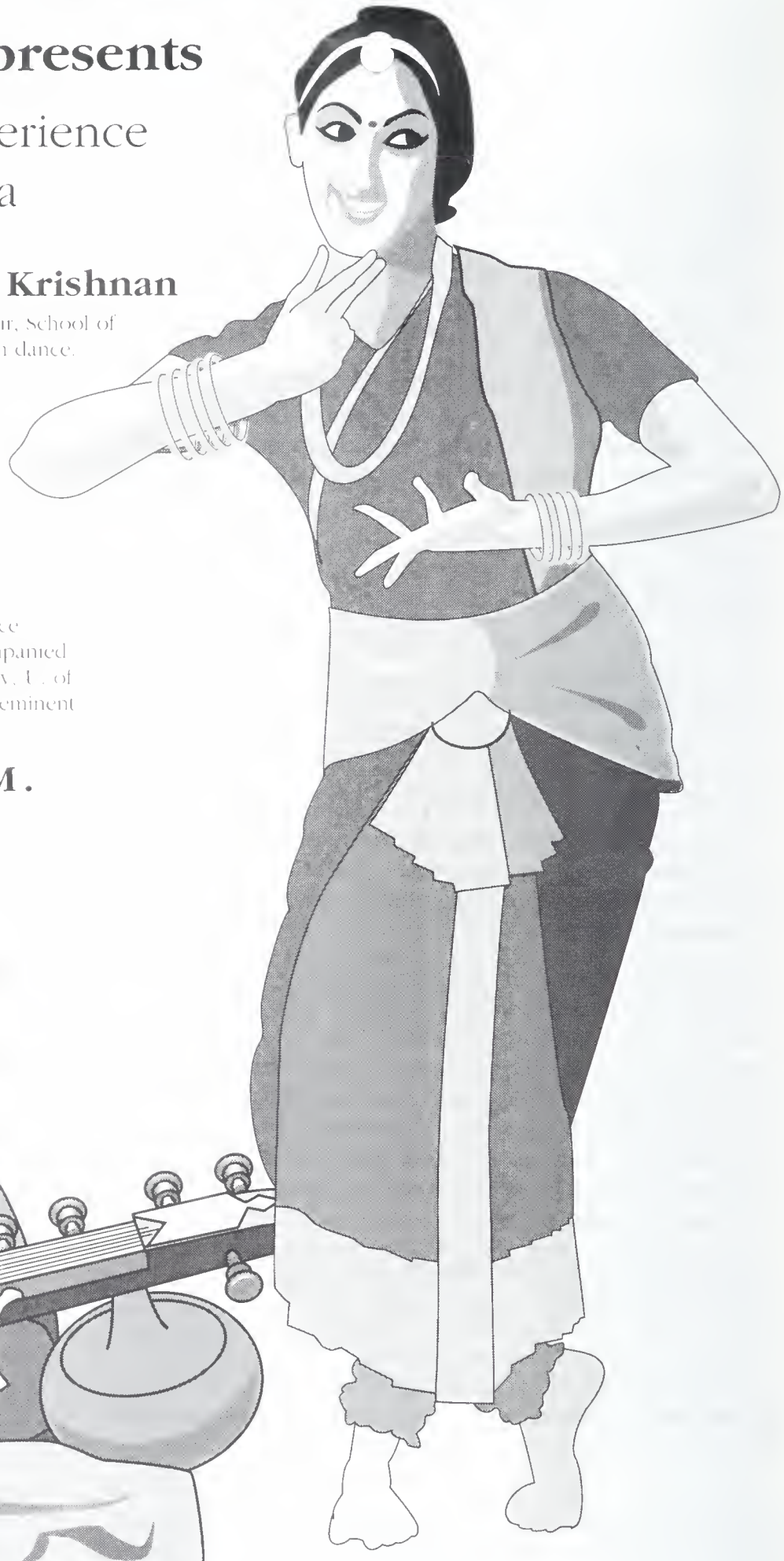
Meera is an accomplished artist and a disciple of Menaka Thakkar, School of Dance. Tonight, Meera will perform the classical Bharathanatyam dance.

Instrumental Concert (Veena) by Mrs. M.Ranganathan

(Faculty of Music, Queen's University)

Veena is an ancient Indian lute instrument. Mrs. M.R. is a child prodigy and a world renouned artist She comes from a well known musical family of South India with a tradition that extends to seven generations. At the age of fifteen she won the coveted President of India award for veena and since then she has received several honours and awards. She is accompanied on the Mridangam by **Dr. Kalluri K. M. Rao**, Dept. of Chemistry, U. of T. Dr K.R. is well known artist who has accompanied several eminent musicians including Mrs. M.R.

January 11, 1991, 7:00 P.M.
Medical Sciences Bldg. Auditorium
1 King's College Circle
University of Toronto
$7.00 admission
($5.00 for students)
further information
or tickets call
292-7915,
924-1419



Kogucki '90

Instructions to Authors 1990-91

The University of Toronto Medical Journal will consider manuscripts in English on basic and clinical aspects of medicine, medical education, medical economics or politics, medicolegal affairs, health care delivery, the history of medicine, and articles concerned with the humane aspects of medicine. All manuscripts should be sent to:

The Editor
The University of Toronto Medical Journal
Room 2141, Medical Society Office
Medical Sciences Building
Toronto, Ontario M5S 1A8

A cover letter signed by all authors should state that the manuscript is not under consideration nor has been published by any other journal and explain the purpose of the paper and its intended readership.

We require an original and three copies (total of four) of the text and three CAMERA-READY copies of the figures, line drawings, and graphs.

Manuscripts should be typed double-spaced, on paper approximately 22 X 28 cm. All submissions should be no longer than 4000 words or about 16 double-spaced typed pages with a maximum of 3-4 figures (graphs, tables, line drawings, photographs). Shorter papers are preferred. Pages should be numbered consecutively starting with the title page, which should include the authors' full names, most recent degrees and affiliations. The title page should be the only one with the authors' names on, and should indicate *exactly* how the names are to appear. To facilitate the doubly anonymous peer review process, do not have the authors' names on pages other than the title page, fully label only one set of illustrations (label the other sets with numbers only), and place acknowledgements on a separate page.

Abstract - An abstract of not more than 200 words, typed on a separate page, is required for each article or note. No abbreviations should appear in the abstract. A translation of the abstract into French, if possible, should be included (abstract only).

References - Each reference should be denoted in the text by an arabic numeral superscript.

The reference list should be placed at the end of the text beginning on a separate sheet and should be listed with the arabic numeral following the order of appearance in the text. Journal article references should correspond to the following style: You Ch, Lee Ky, Chey Wy, Menguy R. Electogastrographie study: a patient with unexplained nausea, bloating and vomiting. Gastroenterology 1980;79:311-314. For further details, see CMAJ 1985;133:443-448.

Tables - Tables should be numbered with arabic numerals, have a brief title, and be referred to in the text. Column headings and descriptive matter in tables should be brief. Vertical rules should not be used.

Illustrations - Each figure should be planned to fit into the area of either one or two columns of text. Photographs and illustrations must be black and white and of good quality. Colour will only be considered if the author, or an outside sponsor, is willing to pay the cost. The figures (including halftones, photographs) are numbered consecutively in arabic numerals, and each one must be referred to in the text as well as being self-explanatory. Only essential labelling should be used with detailed information given in the caption. Letters and numerals should be of such size that the smallest character will not be less than 1 mm high when reduced.

Drug Names -Both nonproprietry (generic) and trade names should be provided for all drugs mentioned.

As we edit manuscripts on both Apple Macintosh and IBM (Word Perfect 5.0) word processing system, we are hoping to process some manuscripts directly from the author's diskette. Please mention if you are willing to send us a diskette along with your manuscript. Accepted manuscripts will be edited not only to conform with UTMJ style and for correctness of grammar, syntax and punctuation, but also for clarity. The author will receive a copy of the edited manuscript or a galley proof before publication and is responsible for obtaining co-authors' approval of the changes. The printers will correct the proof *only for typographical errors* as indicated on the proof returned by the authors. Authors are asked to take the greatest care with the preparation of their papers. It will not be possible to make alterations in the proof except for the correction of typographical errors.

Publication deadlines are September 15, November 15 and January 15. Papers which are submitted earlier will receive greater consideration.

UNIVERSITY OF TORONTO MEDICAL JOURNAL

The *University of Toronto Medical Journal* has been in existence for over sixty years. The Journal is completely managed by the volunteer efforts of undergraduate medical students and Art as Applied to Medicine students. This publication is Canada's oldest undergraduate student publication, and maintains a very high calibre of writing. The Journal consists of articles written by medical students as well as distinguished clinicians in all areas of medicine and surgery. The articles in the *Journal* range broadly in topic from the strictly scientific to the human and moral aspects of medicine.

The *University of Toronto Medical Journal* would not exist without the philanthropic support of doctors. This publication allows physicians to read articles by many of their former professors or clinicians. It also allows doctors to read interesting work done by students, while at the same time permitting students a much needed chance to gain experience in publishing articles.

In the 90-91 academic year, the *Journal* will consist of three issues released between September '90 and June '91. The basic subscription price is $25. Those generous enough to contribute $50 or more will be designated as *Patrons of the Journal*. The patron's name will appear in each issue, with an acknowledgement. In order to receive the *Journal*, please send your payment to the *University of Toronto Medical Journal*, Box 2141, Medical Sciences Building, Toronto, Canada M5S 1A8.

Free copies of last year's *Journal* are available on request. The support of doctors allows the *University of Toronto Medical Journal* to continue its vital role in undergraduate life.

Prepayment by cheque or money order is required.

Mail cheques or money order to:

University of Toronto
MEDICAL JOURNAL

Medical Sciences Building, Room 2141
University of Toronto
Toronto, Ontario M5S 1A8

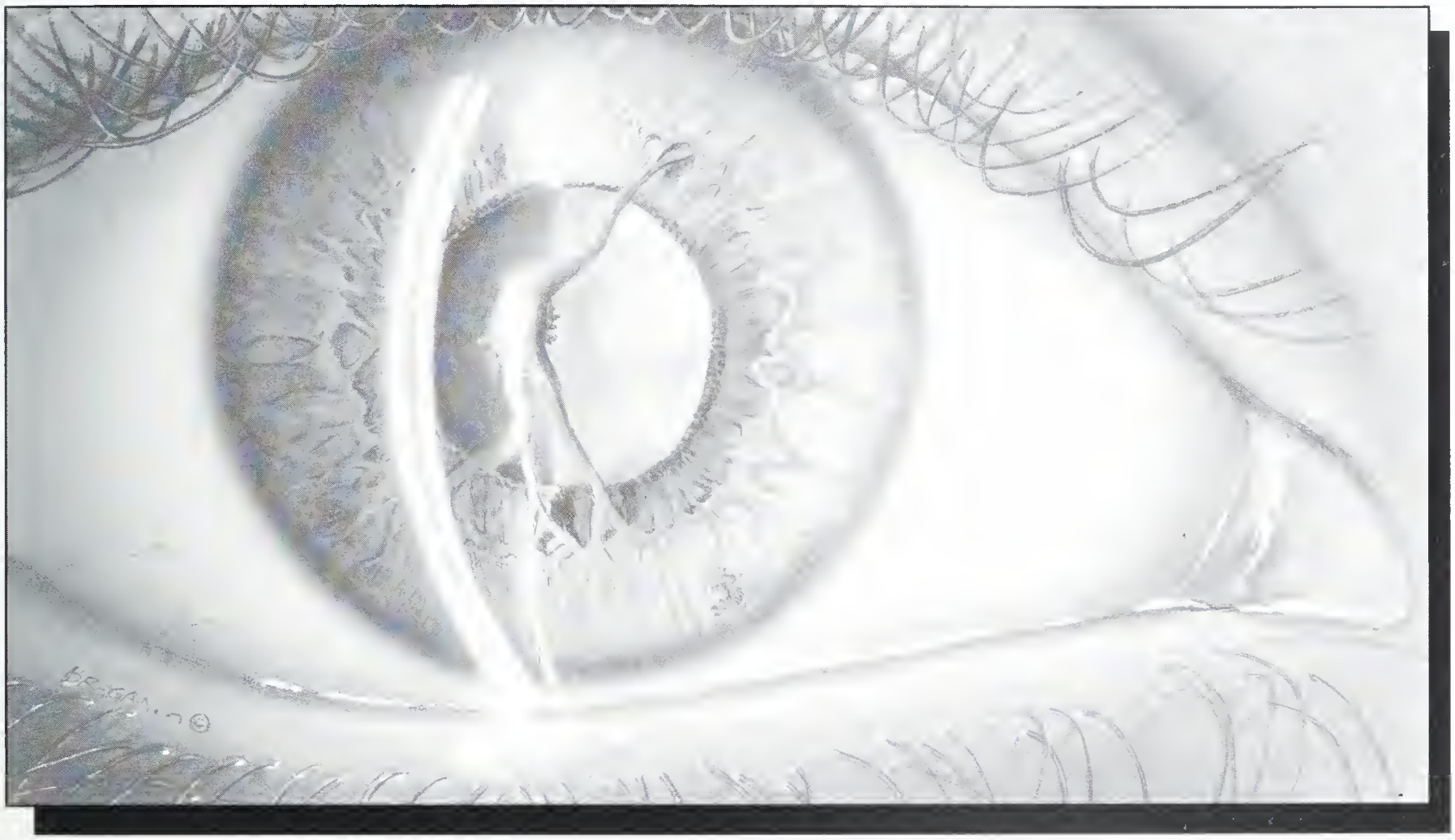
University of Toronto MEDICAL JOURNAL

The official publication of The Medical Society, Faculty of Medicine, University of Toronto
I wish to subscribe to the University of Toronto MEDICAL JOURNAL for one year (3 issues).

Name _____
please print
Address _____

City _____ Province _____ Postal Code _____

The Department of
Art as Applied to Medicine
Faculty of Medicine, University of Toronto



This unique department offers the only Bachelor of Science degree in Art as Applied to Medicine (B.Sc. A.A.M.) in Canada. Only five students, with interdisciplinary backgrounds in art and science, are accepted each year into this three year program.

above: persistant pupillary membrane, by Alan Braganza, third year student.

The subjects of medical illustration span most areas of teaching and research undertaken in health sciences. Students study Anatomy, Embryology, Histology, Physiology, Neuroanatomy, Pathology, Ophthalmology, and Dental Anatomy with medical and health science students. The solid base of scientific knowledge gained from these academic courses is necessary to transform complicated information into medical art which communicates and teaches.

256 McCaul Street, 3rd Floor, Toronto, Ontario, M5T1W5
(416) 978-2659, fax (416) 978-6891

First, It Takes A Memory –
Then, It Takes A Life.

ALZHEIMER'S

Alzheimer's is not a natural part of aging. It is unnatural and tragic: a progressive disease of the brain.

Alzheimer's destroys brain functions erasing what a human has created as a life and, eventually, what a human being is.

Alzheimer's. The tragedy touches whole families. Although some avenues of research are showing promise, medical science has yet found no certain cause and anticipates no sure control or cure for this disease.

OUR COMMITMENT:

Without research, they are without hope. By our commitment to research in Alzheimer's Disease, we affirm our belief that this disease can be understood and overcome.

CIBA–GEIGY

CIBA-GEIGY CANADA LTD.
Pharmaceuticals Division
Mississauga, Ontario
L5N 2W5

The person depicted in this advertisement is a professional model and it is in no way implied that he has or is suffering from Alzheimer's.

M 37 89